DOCUMENT RESUME

ED 177 748 EC 113 228

AUTHOR Andolina, Charlene
TITLE Syntactic Maturity and Vocabulary Richness Learning Disabled Children at Four Age Levels.
INSTITUTION Pittsburgh Univ., Pa.
SPONS AGENCY Office of Education (DHEW), Washington, D.C.
PUB DATE 78
NOTE 161p.; Ph.D. Dissertation, University of Pittsburgh ; Sponsored through the Bureau of the Handicapped Student Research Program
AVAILABLE FROM University Microfilms International, P.O. Box 1346, Ann Arbor, Michigan 48106 (Catalogue No. 7816776; $22.00 hard copy, $11.00 microfiche)

EDRS PRICE MF01/PC07 Plus Postage.
DESCRIPTORS *Age Differences; Exceptional Child Research; *Language Development; *Learning Disabilities; *Speech Communication; Syntax; *Vocabulary Development

ABSTRACT

Four age levels of 80 learning disabled (LD) students (7.5-8.11, 9.0-10.5, 10.6-11.11, and 12.0-13.5 years) participated in an examination of syntactic maturity and vocabulary richness in their oral language. Ss were shown two films without the sound turned on, and were then tape recorded as they told the story of the film in their own words. Transcriptions were analyzed with two measures of syntactic maturity (including the Syntactic Density Score) and two of vocabulary richness (Vocabulary Intensity Index and the corrected type-token ratio). Among findings were that a developmental pattern of syntactic maturity existed as measured by the number of T-units (minimal terminable unit) and the average number of words per T-unit; normal children as measured by length of T-unit experienced periods of rapid growth while LD Ss exhibited gradual progress in their control of syntax throughout the age levels, and there was no observable vocabulary developmental pattern as measured by the Vocabulary Intensity Index and simple type-token ratio. Findings suggested that observation and analysis of oral language should be an integral part of classroom assessment procedures. (CL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED177748

SYNTACTIC MATURITY AND VOCABULARY RICHNESS OF LEARNING DISABLED CHILDREN AT FOUR AGE LEVELS

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

By

Charlene Andolina
B.S., Carlow College, 1969
M. Ed., University of Pittsburgh, 1974

Submitted to the Graduate Faculty in the School
of Education in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy

University of Pittsburgh
April, 1978

EC113228

The research reported herein was performed pursuant to a contract with the Office of Education, Department of Health, Education and Welfare, Bureau of the Handicapped Student Research Program

FINAL REVIEW COMMITTEE

Faculty Member	Department	School
Chairman, Dr. Allen Berger	Language Communications	Education
Dr. Rita Bean	Language Communications	Education
Dr. John Bolvin	Educational Research	Education
Dr. James Peebles	Language Communications	Education
Dr. Naomi Zigmond	Special Education	Education

Date April 6, 1978

To

Carmen

ACKNOWLEDGMENTS

I wish to express my sincere thanks and appreciation to the many people who have provided direction, intellectual stimulation, financial aid, computer assistance, and inspiration throughout this undertaking.

First and foremost I would like to extend my deepest appreciation to Dr. Allen Berger, my advisor and friend, for his untiring guidance, patience, understanding, and encouragement throughout the course of my studies.

I wish also to express my gratitude to Dr. Rita Bean for her friendship, insights, unending support, and sincere interest in my professional growth.

Special thanks are given to Dr. John O. Bolvin, who unselfishly gave of his time, energies, and ideas during the preparation of this document.

My thanks also to Dr. James Peebles for his assistance and cooperation.

Sincere thanks is extended to Dr. Naomi Zigmond for her support and scholarly guidance in my successful attempt to secure a student research grant from the Office of Education, Department of Health, Education, and Welfare, Bureau of the Handicapped.

I would also like to gratefully acknowledge the University of Pittsburgh for providing financial assistance in the form of a graduate assistantship (1976) and a teaching fellowship (1977-1978).

I wish to express my gratitude to Samuel Lombardo for providing computer facilities to obtain the empirical results of this study, Roxann Zurella and Harry Ragar for their help in the data collected

procedures, and the Directors of Special Education for the Intermediate Unit involved in this study. Without their cooperation, this study would not have been accomplished.

Finally, sincere thanks to my parents, MaryGrace and Nicholas Andolina, my sister and brother-in-law, Maryjean and Bob Lovett, my niece Julie and nephew Robbie who have provided love, support, patience, and encouragement throughout my life.

TABLE OF CONTENTS

		Page
I.	THE INTRODUCTION	1
	A. Statement of the Problem	6
	B. Research Questions	6
	C. Definition of Terms	8
	D. Delimitations of the Problem	11
	E. Assumptions Underlying the Study	12
II.	RELATED LITERATURE	13
	A. Normal Language Development	13
	1. Traditional Grammar Era	14
	2. Structural Grammar Era	19
	3. Transformational Grammar Era	23
	B. Language Development of the Learning Disabled	36
III.	METHODOLOGY	45
	A. Sample Selection	45
	B. Procedures for Data Collection	49
	1. Interviewers	50
	2. Procedures for Data Collection	50
	C. Pilot Study	52
	D. Procedures for Preparation of Data Analysis	54
	E. Procedures for Analysis of Data	55
	1. Syntactic Complexity	55
	2. Vocabulary Richness	57
IV.	ANALYSIS OF DATA	59
V.	SUMMARY, FINDINGS, DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH	85
	A. Summary	85
	B. Findings	87

LIST OF TABLES

Table		Page
1.	Distribution of Occupational Classifications of Mothers and Fathers of Children in This Study	48
2.	Pilot Study Procedures	53
3.	Means and Standard Deviations for T-unit	60
4.	Analysis of Variance and Trend Analysis for Number of T-units Across Age Levels	62
5.	Means and Standard Deviations for the Number of Words per T-unit	62
6.	Analysis of Variance and Trend Analysis - T-unit Length Across Four Age Levels	64
7.	A Comparison of Mean T-unit Length Across Four Age Levels	65
8.	Means and Standard Deviations for the Syntactic Density Score	69
9.	Analysis of Variance and Trend Analysis for Syntactic Density Scores Across Four Age Levels	71
10.	Means and Standard Deviations for the Average Total Word Count	71
11.	Analysis of Variance and Trend Analysis for Average Total Word Count Across Four Age Levels	73
12.	Means and Standard Deviations for the Corrected Type-Token Ratio	74
13.	Analysis of Variance and Trend Analysis for Corrected Type-Token Ratio Across Four Age Levels	76
14.	Means and Standard Deviations for Vocabulary Intensity Index Across Four Age Levels	77
15.	Analysis of Variance and Trend Analysis for the Vocabulary Intensity Index Across Four Age Levels	79
16.	Means and Standard Deviations for the Number of Word Types	79
17.	Analysis of Variance and Trend Analysis for Word Types Across Four Age Levels	81
18.	Means and Standard Deviations for Simple Type-Token Ratio	82
19.	Analysis of Variance and Trend Analysis for Simple Type-Token Ratios Across Four Age Levels	83

Page

C. Discussion 89

D. Implications 94

E. Recommendations for Future Research 96

Bibliography 100

Appendixes 107

Appendix A: Comparison of Methodologies Across Four Studies 109

Appendix B: Parent Permission Letter 111

Appendix C: Occupational Titles 114

Appendix D: Information and Instructions for the Investigator, Interviewer and Teachers . . 118

Appendix E: Procedures for Orientation Meetings . . . 122

Appendix F: Syntactic Density Tabulation Sheet 124

Appendix G: Rules of Punctuation 126

Appendix H: Sample Printout of Text and Tabulation Sheet for Syntactic Density Program . . . 129

Appendix I: Basic Word List 132

Appendix J: Vocabulary Intensity Tabulation Sheet . . 136

Appendix K: Sample Printout of Vocabulary Intensity Tabulation Sheet 138

Appendix L: Scores for Measures of Syntactic Maturity and Vocabulary Richness 140

Appendix M: Trend Analysis 145

Vita 147

LIST OF FIGURES

Figure		Page
1.	Mean Number of T-units Across Four Age Levels	61
2.	Mean Number of Words per T-unit Across Four Age Levels . . .	63
3.	Comparison of Mean Length of T-unit Across Four Age Levels .	67
4.	Mean Syntactic Density Score Across Four Age Levels	69
5.	Average Total Word Count Across Four Age Levels	72
6.	Mean Corrected Type-Token Ratio Across Four Age Levels . . .	75
7.	Means for Vocabulary Intensity Index Across Four Age Levels .	78
8.	Mean Number of Word Types Across Four Age Levels	80
9.	Mean Simple Type-Token Ratios Across Four Age Levels	82

CHAPTER I

For more than three-quarters of a century researchers have sought answers to questions concerning the oral language development of children. These studies have resulted in the accumulation of large amounts of data, particularly on the language of very young children. The questions asked, the indexes used, and the findings obtained from this past research deserve repeated consideration with application to a variety of children at various age levels. The present study, therefore, has drawn upon the efforts of previous research on oral and written language development in order to specifically explore the developmental trends in the spontaneous oral language of children with learning disabilities at differing age levels. There was an uncertainty whether the findings with normal children would be generalizable to a population of learning disabled children.

Researchers have applied various methods to measure linguistic maturity. Initially, researchers in language development (Davis, 1937; Day, 1932; McCarthy, 1930) measured length of utterance by dividing language samples into sentences. These sentences were categorized into simple, simple with phrases, complex, compound, and elaborated sentences for analysis of syntactic maturity. They reported that length of sentence and use of greater complexity in syntactical structures increased with chronological age.

During the sixties, language researchers applied structural grammar analysis techniques by dividing language samples into phonological units, "a unit of speech ending with a distinct falling intonation which signals a terminal point" (Strickland, 1962, p. 16). These researchers (Loban, 1963; Strickland, 1962) reported that the phonological unit was not an adequate measure of language maturity since more variance in the length of the unit occurred within than between grades. Younger children spoke in longer units at each grade level, and all children used a wide variety of structural patterns. This led these researchers to conclude that flexibility within the sentence pattern was the best indicator of syntactic maturity. Although the use of the sentence and phonological unit for quantifying language was considered to be beneficial it also created several problems. The term sentence remained ambiguous since it was difficult to define. The phonological unit as well as the sentence produced unsatisfactory results since children frequently used the coordinates "and," "but," and "so" between main clauses producing long run-on sentences. In an effort to identify the basic unit of expression, Hunt (1965) explored four measures; sentence length, clause length, information ratio, and minimal terminable unit. He reported that the "minimal terminable unit" (T-unit) was the most accurate index of syntactic maturity. The T-unit is one main clause plus all subordinated clauses, i.e., a T-unit can be a simple or complex sentence but a compound sentence consists of two T-units.

Researchers who used the minimal terminable unit (T-unit) as a measure of language development have reported it to be an adequate measure of oral and written language development (Bougere, 1968; Ciani,

1974; Fox, 1970; Hunt, 1965; Loban, 1963). Syntactic maturity was indicated by increased T-unit length with chronological age. Although researchers have reported the minimal terminable unit to be a more satisfactory measure of linguistic maturity than the sentence this unit exhibited some limitations. The T-unit does not discriminate among the various ways that mean length of syntactic units could be achieved. The Syntactic Density Score (SDS) developed by two researchers in the early seventies (Golub and Fredrick, 1971) was a more discriminating quantitative measure of syntactic maturity. The SDS took into account measures of T-unit length and subordinate clause length that Hunt and others found beneficial. It also reflected complex verb expansions, use of some advanced structures of time, and reductions or embeddings that took the form of prepositional phrases. By a process of multivariate analysis, ten variables were isolated which were highly correlated with teachers' judgments of high quality writing. By multiple regression and canonical correlation, decimal weights were determined to specify the amount of influence each variable carried. Each of the variables was counted (frequency of occurrence) and weighted, the products were added and the total was divided by the number of T-units in the sample to arrive at a single Syntactic Density Score (SDS) and a grade level equivalency. The mean length of T-unit and Syntactic Density Score (SDS) were found to be highly correlated (O'Donnell, 1976).

Research in linguistics has produced some intricate equations for calculating vocabulary richness which yield a single vocabulary score (Carroll, 1964; Herdan, 1964; Zipf, 1935). Two equations, the direct type-token ratio and the corrected type-token ratio, were based

on the number of different words spoken (word types) to the total number of words spoken (word tokens). The corrected type-token ratio (Carroll, 1964) attempted to account for differences in language sample size by partialling out a particular number of words from the language sample before calculating the ratio. The most often used and simplest index of vocabulary richness was a count of the number of different words (word types) uttered in a language sample. Recently, the strengths and limitations of these equations were studied in an attempt to conceptualize an index that would provide information about several factors that contributed to a single vocabulary score (Kidder, 1974). As a result the Vocabulary Intensity Index was developed to measure the level of vocabulary, diversity of vocabulary, degree of word building application, and use of multisyllable words. Frequency of occurrence of these variables was summed and divided by the total number of words (word tokens) used in the language sample to compute the Vocabulary Intensity Index.

The methods for measuring syntactic maturity devised by Hunt (1965) and for measuring vocabulary richness devised by Carroll (1964) have supported the theory that they were accurate measures when applied to the spontaneous oral and written language of normal children. The methods for measuring syntactic density devised by Golub and Fredrick (1970-1971) and for vocabulary devised by Kidder (1974) have supported the theory that they were accurate measures when applied to the written language of normal children. In this current study the investigator used the Syntactic Density Score and the T-unit as measures of syntactic maturity and the corrected type-token ratio and Vocabulary

Intensity Index as measures of vocabulary richness of a group of exceptional children -- the learning disabled, ranging in age from 7.5 years to 13.5 years, in an effort to describe the developmental trends of these facets of language. The results obtained were compared with the findings of previous research using identical measures involving normal children.

The Problem

What is the developmental trend of syntactic maturity and vocabulary richness of learning disabled children (see p. 8) at four age levels?* How do the developmental trends of syntactic maturity and vocabulary richness of learning disabled children compare with developmental trends of normal children as measured by previous research? In these questions, syntactic maturity was measured by the Syntactic Density Score and T-unit while vocabulary richness was measured using the corrected type-token ratio and the Vocabulary Intensity Index.

Research Questions

The following research questions were formulated for this study:

1. What is the syntactic developmental trend of learning disabled children's oral language at four age levels (7.5 years to 8.11 years, 9.0 years to 10.5 years, 10.6 years to 11.11 years, 12.0

---

* The chronological age of the children ranged from 7.5 years to 8.11 years at the first level, from 9.0 years to 10.5 years at the second level, from 10.6 to 11.11 years at the third level, and from 12.0 years to 13.5 years at the fourth level.

years to 13.5 years) as measured by the number of T-units and the average number of words per T-unit?

2. Is the developmental trend in syntactic maturity of learning disabled children at four age levels (see question 1 above) as measured by T-units similar to that found in previous studies conducted with normal children?

3. What is the syntactic developmental trend of learning disabled children's oral language at four age levels (see question 1 above) as measured by the Syntactic Density Score?

4. Does the average total word count differ at each age level for learning disabled children?

5. What is the developmental trend in the oral language of learning disabled children at four age levels (see question 1 above) as measured by the corrected type-token ratio?

6. Is the developmental trend in the oral language of learning disabled children at four age levels (see question 1 above) as measured by the corrected type-token ratio similar to that found in previous studies conducted with normal children?

7. What is the developmental trend in the oral language of learning disabled children at four age levels (see question 1 above) as measured by the Vocabulary Intensity Index?

a. What is the developmental trend in the oral language of learning disabled children at four age levels (see question

1 above) as measured by the number of different words spoken (word types)?

b. What is the developmental trend in the oral language of learning disabled children at four age levels (see question 1 above) as measured by the simple type-token ratio?

Definition of Terms

Throughout this investigation, the following terms and associated meanings were used:

Word Tokens. Word tokens are the total number of words spoken by each child in this study as he or she orally responds to stimuli in a structured situation.

Word Types. Word types are a count of the number of different words used by each child in this study as he or she orally responds to two stimuli in a structured situation.

Type-token Ratio. The type-token ratio is a measure of vocabulary diversity which is computed by dividing the number of different words spoken by each child in an oral language sample by the total number of words spoken (word tokens).

Corrected Type-token Ratio. The corrected type-token ratio is a measure of vocabulary diversity which is determined by the number of different words used by the subject (word types) divided by the square root of twice the number of words in the language sample (word tokens) (Carroll, 1964).

Garbles. Garbles are those words which are extraneous to the T-unit, i.e., they add no meaning. Word-tangles, repetition of words and phrases, and changes in the beginning of a T-unit are treated as garbles and eliminated from T-units count. Exceptions to this are the words "well," "now-uh," "see," and "you see" which are called holders (Strickland, 1962).

Learning Disabled. Children are considered to be learning disabled if:

1. they showed an IQ of 80 or above on the Wechsler Intelligence Scale for Children (Full Scale), Wechsler Adult Intelligence Scale (Full Scale), or the Stanford-Binet.

2. they have not been judged to be severely emotionally disturbed.

3. they have a learning efficiency which fell below 65% in any of the language arts. Learning efficiency was determined in the following manner:

a. Calculate the child's mental age using the formula MA = IQ x CA.

b. Determine the child's Expected Achievement level by subtracting 5.0 from Mental Age (MA).

c. Calculate the child's learning efficiency by converting the raw score performancy on language arts subtests of an achievement test to grade equivalent scores to determine Actual Achievement (AA). Divide the AA scores by the child's Expected Achievement (EA) (Zigmond).

$$\text{Learning Efficiency} = \frac{AA}{EA} \times 100$$

Minimal Terminable Unit (T-unit). A T-unit is a terminable syntactic unit of minimal length consisting of a main clause plus a clause subordinate to it. A minimal terminable unit (T-unit) is a grammatically complete unit and may be treated as a sentence beginning with a capital letter and ending with a punctuation mark (Hunt, 1965, p. 21).

Syntactic Density. Syntactic density is a qualitative and quantitative list of descriptions of linguistic structures that Golub (1969) identified as being most highly correlated with teachers' judgments of high quality in the writing.

1. Words per T-unit
2. Subordinate clauses per T-unit
3. Main clause word length (mean)
4. Subordinate clause word length (mean)
5. Number of modals (will, shall, can, may, must, would)
6. Number of Be and Have forms in the auxiliary
7. Number of prepositional phrases
8. Number of possessive nouns and pronouns
9. Number of adverbs of time (when, then, once, while ...)
10. Number of gerunds, participles, and absolute phrases (unbound modifiers)

Increases in these measures is evidence of growth in syntactic density, also called "syntactic complexity" or "syntactic maturity."

Syntactic Density Score. The Syntactic Density Score is derived by listing the ten syntactic structures that Golub identified as most highly correlated with teachers' judgments of high quality in writing. By multiple regression and canonical correlation, decimal weightings were determined to indicate the degree of influence each variable carried. The Tabulation Sheet for Golub's formula appears in Appendix F. It lists the ten variables that were found to be most highly significant in distinguishing levels of language performance. The weighting factors for each variable are also presented. Frequency of occurrence of each variable is weighted; products are summed; the total is divided by the number of T-units to complete the Syntactic Density Score. A grade level conversion table is included.

Syntactic Maturity. Syntactic maturity is the observed degree of complexity in the use of grammatical (syntactic) structures.

Vocabulary Intensity Index. Vocabulary Intensity Index (Golub and Fredrick, 1970, 1971) is a measure of the level of vocabulary, diversity of vocabulary, and some degree of word building application. Level of vocabulary is measured by comparing the number of different words used by the subject (word types) against a 500-word frequency list. Vocabulary diversity is calculated by a ratio of the number of different words (word types) to the total number of words used (word tokens) by the subject. Word building application is reflected by a count of prefixes and suffixes used in the language samples. The frequency of occurrence of these variables was summed

and divided by the total number of words spoken (word tokens) to compute the Vocabulary Intensity Index.

Vocabulary Richness. Vocabulary richness is measured by (1) the number of different words spoken (word types) by the subject, (2) the total number of words (word tokens) used by the subject, (3) the corrected type-token ratio, (4) the Vocabulary Intensity Index. These vocabulary richness indexes were applied to the oral language samples of the children in this study as they respond to stimulation in a structured situation.

Delimitations of the Problem

Eighty children were involved in this study. Children with severe articulation problems were excluded. Syntactic maturity and vocabulary richness were the only language factors to be studied as measured by T-units, the Syntactic Density Score, total word count, number of different words spoken (word types), type-token ratio, corrected type-token ratio, and Vocabulary Intensity Index.

Assumptions Underlying This Study

The assumptions underlying this study were (1) narrative speech patterns of the subjects were represented on the recorded language sample secured in a structured setting, (2) the length of a T-unit was an accurate measurement of syntactic maturity, (3) Syntactic Density Score was an accurate measurement of syntactic maturity when applied to written language, (4) total word count was

an accurate measure of syntactic maturity, and (5) linguistic maturity was indicated by vocabulary richness.

CHAPTER II

RELATED LITERATURE

Normal Language Development

Modern research concerned with the oral language development of children began early in the twentieth century. Some researchers studied children's vocabulary (the number of different words spoken in an oral language sample and the total number of words spoken during an oral language sample), the grammatical complexity of their oral language, and/or a combination of these oral language factors. Other researchers have studied oral language development in an effort to predict reading achievement, develop instructional materials, and/or to determine the interrelationship among the language arts. These investigations have been summarized by Carroll (1960), Ciani (1974), Ervin-Tripp (1966), Fox (1970), McCarthy (1954), McNeill (1966), and O'Donnell, Griffin, and Norris (1967).

Preceding the controlled studies of language were the early research efforts of Bateman (1914), the Brandenburgs (1916), the Gates (1900), Nice (1917), and Snyder (1914). These studies conducted between 1900 and 1920 reported that children vary markedly in vocabulary growth and use of various parts of speech. The subjects in these studies were usually the authors' own children, who ranged

from the very precocious to the retarded, so that the findings were not generally applicable.

During the 1920's and 1930's researchers began using representational sampling procedures and systematic data gathering techniques. Dorothea McCarthy (1930), in her research of oral language development, was one of the first to employ standardized procedures. Throughout the next three decades other researchers duplicated McCarthy's methodology, definitions, classifications, and data analysis techniques (Davis, 1973; Day, 19732; Templin, 1957).

This review of normal oral language development research was divided into three theoretical eras as outlined in previous research (Ciani, 1974; Fox, 1970; O'Donnell, Griffin, and Norris, 1967). The first era included studies conducted utilizing the traditional based grammar. Research conducted by Davis (1937), Day (1932), McCarthy (1930), and Templin (1957) was discussed in this period. The second era was influenced by structural theorists such as Strickland (1962) and Loban (1963). The final theoretical era, and the most important for this current study, included research by the transformational generative theorists (Ciani, 1974; Fox, 1970; Golub and Fredrick, 1970, 1971; Hunt, 1965; O'Donnell, Griffin, and Norris (1967).

Traditional Grammar Era

Traditional grammar, adopted by eighteenth-century grammarians, had its roots in classical Latin. This grammar consisted of eight parts of speech, twelve verb tenses, and Latin-derived concepts and terminology. Grammarians assumed that Latin was the most logical language and

that its grammar should provide the terminology, definitions, rules and models for teaching English.

Syntactic Complexity

Early studies of the development of syntax in oral language were influenced by the procedures and techniques of analyses initiated by Dorothea McCarthy in 1930. Her study focused on the function of language, the changes in the length of sentences, the complexity of sentence structure, and the proportion of various parts of speech. Involved were 140 children selected at seven age levels from 18 to 54 months. Parental occupation was the criterion used for selection with each of six occupational classifications represented in the final sample. Sexes were approximately equally distributed in the entire group. Fifty consecutive verbal responses were recorded by an experimenter in a fairly structured situation. Toys and picture books served as the stimuli in each individual interview which took place either in the home or nursery school. In the analysis of data, McCarthy focused on the length of response, and structural complexity in relation to chronological age, sex, mental age, and parental occupation. The length of a response was determined by the number of words in a comprehensible response; in the semicomprehensible responses, the number of syllables combined per response was counted. McCarthy defined a verbal response as complete sentences or clusters of words separated by pauses. Thus, a response could be a sentence fragment. Sentences were categorized according to their grammatical structure, e.g., incomplete, simple, simple with phrases and the number of compound, complex, and elaborated sentences.

These interviewing techniques for stimulating spontaneous oral language and the data analysis procedures established by McCarthy were used by Ella J. Day (1932) in a study comparing the oral language of twins and singletons from 2 to 5 years in age, by Edith Davis (1937) in her study of the linguistic skills of 456 twins, singletons with siblings, and only children from 5.5 years to 9.5 years, and by Mildred C. Templin (1957) who studied the verbal utterances of 480 children from 3 to 8 years. The studies by Davis (1937), Day (1932), and McCarthy (1930) reported some consistent findings. They found that the length of response increased with chronological age, mental age, parental occupation, and socioeconomic status. The sentence length of girls was found to be slightly longer than boys at each age level. Grammatical analysis showed that simple sentences decreased with age while simple sentences with a phrase and compound, complex, and elaborated sentences increased. Girls exhibited a higher level of development in all these analyses as did all children of the upper socioeconomic status group. In addition, Day (1932) and Davis (1937) reported that single children were superior to twins in language and mental development at all age levels. As an added feature in the analysis of her data, Davis (1937) examined the relationship among articulation proficiency, spontaneity, and length of utterance. She found that children with articulation difficulties used shorter sentences and were deficient in spontaneity while children with adequate articulation were able to communicate spontaneously.

Templin compared the results of her study to those of Davis, Day, and McCarthy. Templin found significantly longer utterances at

the same age level. Since this difference could not be attributed to a difference in methodology, Templin indicated that perhaps greater verbal stimulation and more permissive child-adult relationships determined the results. Unlike the previous studies, no consistent sex or socioeconomic trends were found in Templin's analysis of the verbal utterances. Grammatical analyses of Templin's data were in agreement with McCarthy's (1930) study of preschoolers. In contrast to Davis, who found incomplete sentences to increase at age 9.5, Templin found that incomplete sentences decreased during the preschool years and leveled off at about age six. Furthermore, she reported that complexity of grammatical structures became more advanced with increasing age. No significant difference in developmental trends was found as related to sex or socioeconomic status.

Vocabulary Richness

The previously mentioned studies by Davis (1937), McCarthy (1930), and Templin (1957) also investigated vocabulary richness of children. McCarthy analyzed the total number of words spoken by the children (word tokens) and the total number of different words spoken by each child (word types) as a function of sex and mental age. Vocabulary analysis revealed an increase in the total number of words spoken with age. Girls in the lower age group used more words than boys but this difference became less at the older ages. Furthermore, the total number of different words spoken (word types) directly increased as a function of chronological and mental age.

In the analysis of vocabulary, Davis (1937) calculated type-token ratios, the number of different words spoken by each child divided

by the total number of words spoken. She reported that vocabulary diversity decreased with age. Davis also found large differences in language development among the groups, i.e., some children in the lowest age group performed at a higher level than children in the older groups. Girls in particular and children in the upper socioeconomic status in general exhibited greater vocabulary diversity. On all language skills measured, single children performed at a higher level than children with siblings while single children out-performed twins.

Analysis by Templin (1957) of the number of different words used by each child (word types) in 50 verbalizations revealed results similar to those of McCarthy, that is, an increase with chronological age. Unlike the results of McCarthy and Davis, Templin found no statistically significant difference in the mean number of different words used by girls and boys. Girls used more different words at five ages while boys spoke more different words at three age levels. Words used most frequently by the children in this study were also those used most frequently by the children in the Davis study.

Summary

Selected landmark studies in the traditional grammar era influenced by the procedures and techniques devised by McCarthy (1930) have been reviewed. Those researchers who followed her procedures, definitions, classifications, and methods of data analysis (Davis, 1937; Day, 1932; Templin, 1957) supported her findings that (1) children's length of utterances increase with chronological age, (2) the total number of words used (word tokens) and the number of different words used (word types) by each child in the oral language sample increase

with age and, (3) the findings reported in (1) and (2) were also affected by higher mental age and parental occupation. McCarthy (1930) originally called the mean length of response "the simplest and most objective measure of the degree to which children combine words at the various ages." More recently, she stated that no measure "seems to have superseded the mean length of sentence for a reliable, easily determined, objective, quantitative, and easily understood measure of linguistic maturity" (1954, p. 550-551). In contrast to the other studies, Templin reported no significant difference on language factors measured for girls and boys.

Structural Grammar Era

Structural grammar had its roots in the work of Leonard Bloomfield (1933), Bernard Block and George L. Trager (1942), C. C. Fries (1940) among others. Structural grammarians gave attention to describing language at the phonological (speech-sound), morphological (word formation), syntactic (sentence structure), and semantic (meaning) levels. To the structural linguists, grammar was a description of usage, that is, form class words, structure words, and sentence patterns, not a prescribed set of correct or incorrect rules.

Syntactic Complexity

It has been stated (McNeill, 1966) that language acquisition studies and linguistic theory have progressed independently. Studies led by Ruth G. Strickland (1962) and Walter D. Loban (1963) are examples of research which have combined knowledge of language acquisition and linguistic theory. Loban and Strickland attended a linguistic conference

held to formulate analysis procedures to be used in their research projects. As a result of the conference, a schema similar to McCarthy's (1930) was constructed for the study of sentence patterns elicited by children in stimulus situations.

Ruth Strickland (1962), in her study of 575 children from grade one through six with ages ranging from 6 years to 14.11 years, and Walter Loban (1963), in his longitudinal study of the language development of children through grade six, analyzed oral language samples according to the structure of syntactical patterns, length of sentences, frequency of specific syntactic patterns, and flow of language. A sentence was defined as a phonological unit, "a unit of speech ending with a distinct falling intonation which signals a terminal point" (Strickland, 1962, p. 16).

After eliminating fragments of sentences called "mazes," e.g., noises, repeats, holders, and edits, Strickland (1962) analyzed 25 sentences from each child's oral language sample on two levels. Level I was concerned with the patterns of stationary elements termed "slots", and the elements which appear in various locations called "movables". Analysis at Level II determined subordination elements that were "fillers" for slots and movables. The findings of this research revealed that the length of the sentence (phonological unit) varied more within groups than between groups. In addition, younger children used longer phonological units than older children while girls spoke in longer units than boys. This led Strickland to report that the length of the sentence was not an adequate measure of language maturity, a conclusion supported by Loban's research (1963). When the children were

grouped by parental occupation, or intelligence, there was no significant difference in the frequency of specific syntactic patterns, while some differences were found when grouped by level of parental education.

Strickland (1962) stated that "the value of this research resides mainly in the evidence it has produced regarding the patterns used by children and the tremendous flexibility with which children use these patterns in their oral language" (p. 106). Since she found a wide range of syntactic structures being used by children at all age levels, Strickland concluded that children learn the basic structures of their language at an early age.

In addition to segmenting the oral language samples into phonological units as reported by Strickland, Loban (1963) used two additional methods: the communication unit and the maze. Loban defined communication unit as each independent clause with its modifiers. A maze was defined as a series of words, word parts, or unattached fragments which did not make up a communication unit and was not a necessary part of a communication unit. Loban measured fluency using four criteria: total word count, freedom from mazes, extent of vocabulary, and speaking manner.

Loban (1963) concluded that the total number of words used (word tokens), number of communication units, and mean number of words spoken in communication units increased with chronological age, while the number of mazes and the number of words in mazes decreased with chronological age. In addition, he found that mazes and communication units appeared to be promising measures of language development since they could be verified independently. Finally, flexibility within structure patterns, i.e.,

what is done to achieve flexibility within patterns, was found to be the discriminating measure of language development, a fact later confirmed by Strang and Hocker (1965) in their study of the oral language of first grade children in a variety of stimulus situations. Strang and Hocker also reported that language patterns and sentence length were influenced by the situation in which the children spoke.

Results of Loban's thirteen year longitudinal study were reported in his second monograph, Language Development: Kindergarten through Grade Twelve, published in 1976. This research report was concerned with stages, velocity, and relative growth of children's language. The communication unit was again employed for linguistic analysis. This study supported the theory "that growth in children's language does in fact follow a predictable sequence, but that the velocity and relative yearly growth rates are uneven" (O'Donnell, 1977, p. 51). Whether or not definite stages of language development could be identified could not be positively answered on the basis of these findings. Furthermore, as reported in his first monograph (1963), Loban concluded that the mean number of words per communication unit was a very useful measure of language development.

Summary

Studies by Strickland, Loban, and Strang and Hocker supported the theory that the sentence was not an adequate measure of language maturity, but rather, flexibility within structural patterns indicated syntactic maturity. The use of mazes was found to decrease with increasing linguistic sophistication. Strang and Hocker also reported that the situations in which a language sample was collected influenced

the content, language patterns, and sentence length. Loban applied transformational grammar analysis techniques to the oral language samples of two children. He realized the potential value of transformational analysis but found it be very time consuming. Loban found the communication unit to be a very satisfactory measure since it demonstrated its ability to differentiate among grade levels and between high and low ability groups.

Transformational Grammar Era

Although the other two theoretical periods presented important background information, this era directly related to this present study. The theory of grammar presented is called transformational generative grammar, otherwise referred to as transformational grammar. The major contributor to this system was Noam Chomsky of the Massachusetts Institute of Technology. Chomsky first expounded this method in his book Syntactic Structures (1957) and then revised and somewhat changed the concept in Aspects of the Theory of Syntax (1965). Linguists of transformational grammar believed that men and women had an innate rational ability which permitted them to generate the underlying rules (syntax) of their language once they have been exposed to it. Each individual possessed a device for acquiring his or her native language. In the process of generating sentences of the language, these grammarians attempted to provide certain information about their structure and show how different structures were related to each other. Chomsky (1965) concluded that a generative grammar was "simply a system of rules that in some explicit and well defined way assigns structural descriptions to a sentence" (p. 8).

Generative grammarians clearly differentiated between language competence and language performance. Noam Chomsky (1965) emphasized that language competence was the knowledge of principles and rules governing the language that men and women had mastered and internalized. Performance referred to the observable language behavior exhibited during speaking, reading, and writing. Chomsky (1965, p. 54) stated that analysis of performance would not totally reveal the person's language competence, that is, competence would not be fully exhibited in a sample of performance. It has been stated (Fox, 1970) that because of various extraneous factors an individual is usually unable to perform at his level of competence.

In an article of Elementary English, Roger McCaig (1970) highly criticized observation type studies by Hunt (1963), Loban (1963), McCarthy (1930), O'Donnell, Griffin, and Norris (1967), Strickland (1962), and Templin (1957). McCaig (1970) specifically criticized methods employed by these researchers for stimulating and analyzing language samples. That is, he did not like their method of analyzing the flow of language after the collection of the samples. McCaig preferred the techniques used by Berko (1958), Brown and Bellugi (1960), and Menyuk (1963), who prepared a list of items to inventory in advance of collecting oral language samples and who worked with small populations in longitudinal studies.

Hunt (197) responded to this criticism by pointing out that these research studies were approached differently than language acquisition studies which tested hypotheses based on transformational theory. The observation studies analyzed spontaneous oral language whereas testing type research elicited and analyzed specified grammatical structures.

Examples of the testing type theory of investigation were found in the work of Berko (1958), Brown and Bellugi (1960), Menyuk (1963), and Carol Chomsky (1969). Hunt (1970) concluded that these testing type studies were language acquisition oriented whereas the observation studies criticized by McCaig, of which Hunt's work is typical, were concerned with language development.

Hunt (1970) and Strickland (1970) agreed that their studies were designed for the stated purposes of inventorying and describing language. Results from this type of research provided a base for future hypothesizing whereas language acquisition studies tested predetermined hypotheses.

Syntactic Complexity

Kellogg W. Hunt (1965) applied transformation grammar theory to the analysis of spontaneously produced written language of 54 school aged children in Tallahassee, Florida. One of the most important contributions of his work was the identification of the basic unit of expression called the "minimal terminable unit" (T-unit). This objective quantitative measure was also applicable to the analysis of oral language samples. The T-unit was described as "one main clause with all the subordinated clauses attached to it" (Hunt, 1965, p. 20). The T-unit, then, "is equivalent to a simple or complex sentence but a compound sentence consists of two T-units" (O'Donnell, Griffin, and Norris, 1967, p. 43). This measure was equivalent to the communication unit used by Loban (1963, 1976).

Hunt explored four measures (sentence length, clause length, subordination ratio, T-unit) to determine which produced statistically significant increases from grade to grade. He reported (Hunt, 1965) that sentence length or phonological unit (Loban, 1962; Strickland, 1962) was the poorest index of language maturity because children frequently used the coordinates "and," "but," and "so" between main clauses, thus producing long run-together sentences. Next, Hunt found that with clause length there were too many overlaps in grades eight and twelve. The subordination ratio resulted in overlapping among individuals within groups. Finally, with the "minimal terminable unit" (T-unit), Hunt found statistically significant increases in mean length of T-units with minimal overlapping among groups. These findings led Hunt (1965) to conclude that the T-unit was the most accurate index of syntactic maturity, then clause length, subordination ratio, and finally sentence length. Increases in the length of T-unit throughout the grades tested were attributed to the formation of subordinate clauses and the use of modifiers and coordination within clauses. The youngest children initially expanded T-units by adding subordinate clauses. In later years, the children expanded the clauses. Thus, the number of subordinate clauses did not increase as much as the length of the clause.

O'Donnell, Griffin, and Norris (1967) demonstrated that T-unit length was a useful measure of oral as well as written language complexity. Involved were 180 children, 30 from each grade level, kindergarten through third, plus those in fifth and seventh grades in the Michell Neilson School in Murfreesboro, Tennessee. All children were

from predominantly white middle-class families. The language samples were based on the children's responses to two Aesop fable films shown without sound. "The Ant and the Dove" and "The North Wind and the Sun" are part of the Coronet Language Arts Series. The oral language samples were first marked for audible pauses and garbles, false starts, redundant subjects, word-tangles, and noncommunicative repetitions. Once these were eliminated, a word count of each subject's responses was made. Finally, they segmented the language samples into T-units. O'Donnell, Griffin, and Norris reported that there was a steady increase in length of responses at all grade levels studied. From kindergarten to the end of Grade 1 and from the end of Grade 5 to the end of Grade 7, total words uttered increased the least where the control of syntax was most pronounced. The researchers concluded, therefore, that length of total response was not an adequate measure of linguistic maturity. Analysis of the data on length of T-unit showed significant increments in mean length of T-unit from grade to grade. These statistically significant increases in length of T-unit were also seen from kindergarten to the end of Grade 1 and from the end of Grade 5 to the end of Grade 7. Furthermore, except for the fifth grade sample, boys produced longer oral responses than girls. Also, the T-unit length of boys was greater than girls when grade level was not considered. This research team from George Peabody College for Teachers concluded that "mean length of T-unit has special claim to consideration as a simple, objective, valid indicator of development of syntactic control" (O'Donnell, Griffin, and Norris, 1967, pp. 98-99).

In 1970, Sharon E. Fox partially replicated various aspects of the previously mentioned study with 80 children in grades kindergarten through third. She found a similar developmental pattern, that is, the mean length of T-units for these grades increased at each level. The significant growth between kindergarten and first grade as compared with the growth in the other periods was also confirmed. Fox reported that syntactic maturity as measured by the length of T-unit showed significant increases at identical growth periods. In contrast to the O'Donnell, Griffin, and Norris study, Fox found that boys did not use longer T-units than girls.

Alfred Ciani (1974) partially replicated the research by the Peabody research team and Sharon Fox in his study of the oral language of children from a rural community in Indiana in grades first through third. A film unlike the ones used in the comparison studies served to elicit the oral language samples. Syntactic maturity was measured by the average length of T-unit. Ciani found that length of T-unit increased across grade levels with the greatest increase between grades two and three with nonsignificant growth between grades one and two. This finding was in agreement with Fox's report. A similar developmental pattern was also found in the mean total number of words spoken by children at each grade level, that is, there was an increase between grades one and two with a sharp increase between grades two and three. No significant differences appeared between the sexes at each grade level which supported the findings of Fox (1970). Finally, Ciani reported that T-unit results were not very similar to the comparison studies. This, he concluded, was perhaps the result of differences in the stimulus material or the different population sampled.

Immediately after the research by O'Donnell, Griffin, and Norris (1967) was completed, O'Donnell (1968) commented on the value and limitations of the indexes of language development used in his study:

> Although it is evident that clause length, T-unit length and number of clauses per T-unit increase with advance in grade, there are no data to show how consistently these indices measure the structural complexity of an individual student's writing in various situations (p. 6)

In a later article, O'Donnell (1976) stated that:

> An obvious limitation of T-unit length lies in the fact that indices based on mean length of syntactic units do not discriminate among the various ways length can be achieved. The T-unit is more satisfactory in this respect than the sentence, but the T-unit can be lengthened in a variety of ways, some of which require much more linguistic maturity than others. The desire to find a more discriminating index of language development has led researchers to attempt to develop more sensitive indices of structural growth (p. 3).

Golub and Fredrick (1970, 1971) identified and described the specific syntactic features that were more discriminating. In 1970, they analyzed samples of written discourse from 80 fourth graders and 80 sixth graders. A comparison was made between the structures and deviations and the teachers' ratings of the quality of the writing. The samples, grouped high, medium and low, were analyzed on 63 measures. Analysis included tabulation of form class words, function words, ratio of form class to function words, T-units, average number of main and subordinate clauses, the number of different basic sentence patterns, count of unique verbs, various classes of suffixes, and counts of adverbs by position and types. They found fourth graders wrote more, shorter T-units than sixth graders. Sixth graders scored

higher on clauses per T-unit, subordinate adjective clauses, modals, nouns per T-unit, adverbs in the medial position after the verb, adverbs of manner, adjective endings and relative clauses.

In their 1971 study, Golub and Fredrick compared written discourse when the stimuli were varied. They discovered that concrete, black and white pictures stimulated responses that were more complex and diverse in structure than colored, abstract pictures. As a result of this research, Golub developed a procedure for obtaining a quantitative index of syntactic density. By a process of multivariate analysis he isolated ten variables which were highly correlated with teachers' judgments of children's writing. Relative weights were assigned to each variable according to its contribution to syntactic density. The variables were counted and weighed. The resulting products were totaled and divided by the number of T-units in the sample to obtain the Syntactic Density Score (SDS). The Syntactic Density Score took into account measures of T-unit length, clause length, number of subordinate clauses, plus more complex structures such as embeddings and verb expansions. Golub cautioned that this formula should be used in conjunction with a vocabulary measure for a more complete analysis of language complexity. As a result, Carole Kidder (1974) developed the Vocabulary Density instrument. In her study of the written language of 119 elementary school children, she found that the Vocabulary Intensity Index when coupled with the Syntactic Density instrument did give a more complete analysis of language complexity or development at the primary and intermediate grade levels.

In 1976, Roy O'Donnell studied the correlation between mean length of T-unit and Syntactic Density Score and compared the mean length of T-unit and Syntactic Density Score as an indication of grade level of written discourse. Thirty-two sixth graders wrote compositions that were analyzed for mean length of T-unit and mean number of clauses per T-unit. The compositions were also analyzed by computing the SDS. O'Donnell (1976) concluded that the SDS and T-unit length were highly correlated (Rho = .88). Furthermore, he stated that T-unit length could be computed for a fraction of the cost of the SDS, and therefore, the SDS should be used only when a detailed analysis is required or justified. "Thus, it appears that, in spite of its lack of precision, T-unit length is for many purposes a more useful and usable index of syntactic development than the Syntactic Density Score" (O'Donnell, 1976, p. 9). Also, the findings of this study revealed that the mean length of T-unit was a better indicator of grade level than the SDS.

In 1974, Kidder analyzed the written language of 119 children in the primary, intermediate and upper primary grades at the campus school at Lock Haven State College using the Syntactic Density Score. She found a clear trend for the mean scores to increase at each grade level and a general trend for the mean scores to increase by age especially at two year intervals. These results were consistent with the results of earlier studies which showed trends for continuing development in children's abilities to manipulate more complex structures (Hunt, 1965; O'Donnell, Griffin, and Norris, 1967).

Vocabulary Richness

Fox (1970) studied vocabulary richness among grade levels and between the sexes. Vocabulary richness was measured by the number of word types spoken and the corrected type-token ratio calculated by dividing the number of word types by the square root of twice the number of word tokens (Carroll, 1964). Fox reported that the mean number of word types spoken at each grade level consistently increased. This finding supported the results of studies by McCarthy (1930) and Templin (1957) using this measure. Significant increases in the mean number of words spoken occurred between kindergarten and first grade. Greater vocabulary diversity was indicated as measured by the corrected type-token ratio with higher grade level. The significance between kindergarten and first grade dropped from a .01 on the number of word types to .05 on the ratio. The significance levels reversed on these vocabulary measures between second and third grades, that is, from a .05 on number of types to a .01 on the ratio.

Ciani (1974), replicating various aspects of Fox's study, looked at vocabulary richness of first through third graders as measured by the corrected type-token ratio. In contrast to the Fox study, Cinai found no developmental trends as measured by the corrected type-token ratio. He considered three other indexes as complementary measures: the number of different words spoken in the language samples, the total number of words uttered, and the type-token ratio (number of different words uttered divided by the total number of words spoken). Ciani (1974, pp. 61-63) reported an increase in the mean number of

different words spoken across all grade levels with the most pronounced increase between grades two and three. The mean total number of words spoken by children at each grade level was similar between grades one and two with a sharp increase between grades two and three. Finally, the mean type-token ratio scores showed a slight increase across the three grade levels.

Kidder (1974) studied the strengths and limitations of word frequency lists and examined the intricate equations for calculating vocabulary richness and intensity (Carroll, 1964; Herdan, 1962; Zipf, 1935) in an effort to conceptualize an index that would provide information about the factors that contributed to the vocabulary score. As a result, she developed the Vocabulary Intensity Index (VII). The theoretical base of the Vocabulary Intensity Index (VII) reflected a consideration of the level of vocabulary difficulty, diversity of vocabulary, number of multisyllabic words, and word building application. To assess level of vocabulary, the VII compared language samples to a list of the 500 words most frequently encountered by third graders. Vocabulary diversity was calculated by a ratio of the number of different words used (word types) to the total number of words used (word tokens). Multisyllabic words were counted. Word building was reflected by a count of the number of prefixes and suffixes used in a sample.

When Kidder analyzed by grade and age the written language of 119 children in the primary, intermediate, and upper elementary levels at Akeley School on the campus of Lock Haven State College, she found increases in vocabulary intensity in the early years, plateaus and regressions in the middle years, and an upward curve in the upper elementary

years. Kidder (1974, p. 90) reported that these variances could be attributed to a variety of factors; (1) vocabulary development may be influenced by other factors in the stages of maturation, (2) vocabulary development does not develop as measurably as syntax and/or, (3) vocabulary development levels off after third grade. Syntax and vocabulary development increased together in the early years while syntax continued to increase beyond third grade.

Summary

Two types of language studies have resulted from transformational grammar theory. Language acquisition studies which tested predetermined hypotheses were one type. Another type observed language usage and described language development while raising hypotheses to be tested.

Language usage studies have verified the unreliability of the sentence as an adequate measure of linguistic maturity. An objective quantitative measure of syntactic maturity was the T-unit as reported by Ciani (1974), Fox (1970), Hunt (1965), and O'Donnell, Griffin, and Norris (1967). Sex differences in relation to syntactic maturity favored boys at a nonsignificant level, while vocabulary diversity measures did not differentiate between the sexes.

Another very promising measure of syntactic maturity was the Syntactic Density Score (Golub and Fredrick, 1970, 1971; Kidder, 1974). The SDS, unlike the T-unit, discriminated among the various ways that T-unit length could be achieved. O'Donnell reported that the SDS and T-unit were highly correlated, but the SDS was an expensive measure to

be used discriminately. He concluded that "in spite of its lack of precision, T-unit length is for many purposes a more useful endurable index of syntactic development than the Syntactic Density Score" (p. 9).

Vocabulary richness was investigated by Ciani (1974) and Fox (1970) as measured by the number of different words used and the corrected type-token ratio. In contrast to the Ciani study, results of the Fox study showed significant differences or developmental trends as measured by the corrected type-token ratio. In the Ciani study, the complementary measures of the type-token ratio and the number of different words spoken increased at each grade level.

Kidder (1974) devised the Vocabulary Intensity Index in an effort to obtain a more discriminating measure of vocabulary richness. The Vocabulary Intensity Index considered level of vocabulary, diversity of vocabulary, number of multisyllabic words and word building application. She found that variances in vocabulary growth seemed to have occurred as a result of one of several factors related to the development of vocabulary in children.

Hunt (1965) introduced the T-unit as a measure of linguistic maturity when he analyzed the written discourse of university school children. In 1968, O'Donnell, Griffin, and Norris applied the T-unit to analyze and compare the oral and written language of children from white middle-class families in Tennessee. Fox (1970) employed Hunt's T-unit in her study, which partially replicated the Tennessee study, and found it to be a useful measure of primary school children's oral language. Ciani (1974) used the T-unit as one measure to assess the oral language of rural primary school children in Indiana. This

previously mentioned research supported the theory that the T-unit was a more useful and usable quantitative measure of syntactic maturity.

Language Development of the Learning Disabled

Observation has suggested that children and adolescents with learning disabilities produce grammatically incorrect and incomplete sentences, use a limited set of syntactic structures, overuse a restricted limited vocabulary, and frequently use fillers, such as and, then, now, um, (Doehring, 1968; Johnson and Myklebust, 1967: Wiig and Semel, 1975a). Word finding and retrieval deficits, deficits in sentence formulation, conceptualization, symbolization, and verbal (motor) encoding have been suggested as possible causes for these expressive language deficits (Bannatyne, 1971; Johnson, 1968; Johnson and Myklebust, 1967; Wiig and Semel, 1975a, 1975b).

Many of the early observations came from the field of speech pathology. Language pathologists used a variety of methods to evaluate the oral language development and status of children. The methodologies used were the ones by McCarthy (1930) and further developed and used by Davis (1937), Day (1932), and Templin (1957), e.g., mean length of response and complete responses, mean of five longest responses, and a number of one-word responses.

Within the last fifteen years, research has contributed valuable information about the types of structures and amount of their use in the oral language of children with learning disabilities at various ages. Most of these studies did not apply transformational grammar analysis to

their data. In recent years, there has been a growing body of literature which has been influenced by Chomsky (1957, 1965) and the generative transformational theories of linguistics. The majority of these studies measuring the syntactic abilities of learning disabled children have used sentence repetition tasks with children in a limited age range (Meir, 1971; Menyuk, 1964b; Menyuk and Looney, 1972a; Menyuk and Looney, 1972b; Vogel, 1974; Wiig and Semel, 1975b).

While no study was found by the investigator which bears directly on the developmental trend of syntactic maturity and vocabulary richness in the spontaneous oral language of learning disabled children over a wide age range, a number of somewhat related studies were found. This section of the review of related literature summarizes those studies.

Syntactic Complexity

Paula Menyuk (1964a, 1969, Chapter 4) in her first attempt to compare normal and deviant children's oral language, applied transformational grammar analysis (Chomsky, 1957, 1965) techniques to their spontaneous oral utterances. Involved were ten children diagnosed as using infantile speech and a matched group of normals. Subjects were matched on the variables of I.Q., sex, and socioeconomic status. They ranged in age from 3 years to 5.11 years. The "infantile speech" label implied that the children

> ... were producing language which to the labeler, was deemed more appropriate for younger groups of children. This, in turn, might imply that it was taking longer for these children to proceed through the usual sequences of language acquisition than it does for normal speaking children, but that they are nevertheless going through the normal sequence (Menyuk, 1969, p. 127).

Language samples were elicited in three stimulus situations: (1) the children responded to three pictures from a projective test, (2) conversation with an adult examiner, and (3) repetition of lists of grammatical and nongrammatical sentences.

Analysis of the data revealed two major findings. The six-year-old children in the infantile speech group were not using language structures which matched those used by the two-year-old normals. Thus, the infantile speech group was seriously delayed in their use of structures. Secondly, children with normal speech production used a variety of grammatical transformations while the infantile speech group produced restricted forms and frequently repeated them. Menyuk concluded that these children were not merely slower in developing language, but rather it appeared that normal language development was stopped at a particular stage. Menyuk suggested the need for further research beyond the six year age level.

On the sentence repetition tasks used by Menyuk, children with language disorders omitted phrases or the last word in a sentence. Normal speaking children modified or repeated the sentence structures according to the rules of grammar, whereas the children with deviant language rarely modified sentences according to the rules of grammar. Furthermore, normal speaking children's level of syntactic competence was superior in their sentence repetition tasks. The language disordered group exceeded the level of syntactic competence in their spontaneous speech.

> It appears, then, that whereas normal speaking children have the capacity to store and fully or at least partially analyze a sentence (depending on its structure), children using disordered language are incapable of this task unless the sentence is short enough and/or simple enough (Menyuk, 1971, p. 213).

For the purpose of exploring more thoroughly Menyuk's observations that the linguistically deviant child was not just slower in syntactic development but developed in a "bizarre" manner, Lee (1966) analyzed the oral syntactic development of atypical children. She used The Developmental Sentence Types, a theoretical construct of early syntactic development in children's language. This method of analysis was based on the transformational structures described by Chomsky (1957), e.g., additions, deletions, and/or rearrangement of words in basic kernel sentences.

In order to test this theoretical construct, Lee recorded and transcribed the spontaneous speech of two boys. Pat, age 3.1 years, exhibited normal language development patterns when engaged in spontaneous conversation with his mother. Mike, age 4.3, judged to be "language delayed", responded with much prodding to a picture. At the time of this tape recording, Mike was enrolled at the Northwestern University Speech Clinic. Lee deleted from analysis all inaudible utterances and interjections such as "hm," "uh," "uh huh," "pump," "poop," and "bzoom" called "fill-ins." After all of these deletions, 105 spontaneous utterances produced by Mike and Pat were prepared for analysis.

Analysis of the data revealed results similar to those reported by Menyuk (1964a). Lee reported that children who have been termed "language delayed" do not progress through normal linguistic levels

of development at a slower rate, but rather they were "failing to make some of the linguistic generalizations upon which syntactic development depends" (Lee, 1966, p. 329). Unlike the children in Lee's study (1966), the children in Menyuk's study expressed subject and predicate relationships. Lee concluded therefore that children with language disorders vary in their language performance.

Morehead and Ingram (1973) conducted a study of normal and linguistically deviant children in an attempt to understand and clarify reports of Menyuk (1964a) and Lee (1966). This comparative study involved 15 normal and 15 linguistically deviant children from 6 years to 9.5 years, and normal children ranging in age from 1.7 years to 3.1 years. Oral language samples were collected in three stimulus situations: (1) free play with an adult, (2) free play with toys and (3) responses made while viewing a book. An adaptation of Chomsky's (1965) transformational grammar was used for the analysis of the language samples.

Analysis of the data revealed that although both groups exhibited similar linguistic systems, the deficient children did not efficiently use their systems. Morehead and Ingram concluded that

> deficient children, at least at the levels studied, add words to their existing constructions but fail to develop the combinatorial potential that is inherent in their grammars -- a failure evidenced by less frequent use rather than absence of more complex structures within a given level of linguistic development (1973, pp. 209-210).

In contradiction to the reports of Menyuk (1964a) and Lee (1966), they found that language delayed children progressed through

the same levels of development of normal children, but did so at a slower rate.

In 1967, two doctoral students at the University of Iowa (Fry, 1967; Schulte, 1967) studied the oral language factors of 36 dyslexic children and 21 normal readers in the second grade. The criteria used for selection included age, intelligence, socioeconomic status, and sex. Twenty pictures served as stimuli to elicit oral language samples. In a semistructured situation the subjects were requested to tell a story about each picture. Recordings of the oral language samples were transcribed. Fifty grammatically independent clauses were selected for analysis employing two linguistic methods. The first measure was traditional in nature, that is, proportion of total words, total different words, type-token ratio, and types and frequencies of different syntactic patterns. Chomsky's (1957, 1965) transformational grammar model was the second method of analysis used.

Analysis of the data resulted in three major findings. First, the good readers spoke with greater fluency and had larger speaking vocabularies. Secondly, normal readers appeared to exhibit a more mature linguistic development than poor readers. This finding was substantiated by normal readers' use of modifications in the predicate position and more subordination in the subject. Finally, poor readers tended to desribe obvious characteristics of the stimuli whereas normal readers gave more creative, detailed descriptions. They concluded that language disabilities were possibly related to reading disability.

Procedures similar to those reported by Menyuk (1964a) were used by Rosenthal (1970) in his study of the oral language of five children who had a definitive diagnosis of minimal brain dysfunction and three control subjects equivalent in socioeconomic status, age, and sex. Oral language samples were collected in three stimulus situations: (1) informal conversation, (2) responses to questions, and (3) imitations and sentence completions, using a variety of transformations and restricted forms.

Analysis of the data revealed that there was no difference between the two groups in the first two stimulus situations. Differences were reported between the groups in the third situation. The learning disabled children had difficulty with sentence completion, imitation and negation.

Susan Vogel (1974) investigated the syntactic abilities in the auditory language of dyslexic and normal children ranging in age from 7.4 years to 8.5 years. Five aspects of syntactic functioning in oral language were evaluated using nine measures. These categories included (1) recognition of melody pattern, (2) recognition of grammaticality, (3) comprehension of syntax, (4) sentence repetition, and (5) syntax and morphology and expressive language. Syntax in spontaneous expressive language was analyzed using the Lee and Canter (1971) Developmental Sentence Scoring (DSS) Procedure. The DSS estimates the extent to which a child has generalized the grammatical rules of his language. The development of this procedure was influenced by research in the field of psycholinguistics (Bloom, 1968; Brown and Frazer, 1964, 1968; C. Chomsky, 1969; N. Chomsky, 1957, 1965; Klima

and Bellugi, 1966; Menyuk, 1966; McNeil, 1966). Vogel (1974) concluded that the dyslexic children exhibited delays in the use of syntax in spontaneous oral language as measured by the DSS. However, she did not describe or discuss those characteristic structures which differentiated the two groups.

In a research project at Boston University, Slegman (1974) also used the Developmental Scoring Procedure to analyze the spontaneous oral language of four dyslexic children. The three boys and one girl ranged in age from 10.8 years to 12.4 years. Analysis of the data revealed that one girl and two boys obtained scores below the fiftieth percentile according to the norms of the DSS which were established for children ranging in age from 6.6 years to 6.11 years. This suggested that these children exhibited delays in use of syntactical structures of from 5 to 6 years. The third male child scored above the norms for a six year old but also used deviant syntactic structures.

Summary

Research on the spontaneous oral language of children with learning disabilities using transformational grammar theories was scarce. Paula Menyuk (1964a) was one of the first investigators to have applied these methods of analysis to language disabled children. She reported that these children not only exhibited delays in language development, but they also used language in a different way from normal children.

In 1966, Lee studied a normal child and language disabled child to explore in more detail the findings reported by Menyuk (1964a). Lee

also found that language delayed children did not follow the normal developmental pattern at a slower rate, but rather they failed to produce certain syntactic structures. Unlike the language delayed children in Lee's study, Menyuk found that the language delayed children in her study expressed subject and predicate relationships in their sentences.

In order to clarify the results reported by Menyuk (1964a) and Lee (1966), Morehead and Ingram (1973) studied normal and language delayed children. They concluded that contrary to the findings of Menyuk and Lee,

> ... linguistically deviant children do not develop bizarre linguistical systems that are qualitatively different from normal children. Rather they develop quite similar linguistic system with marked delay in the onset and acquisition times. Moreover, once the linguistic systems are developed, deviant children do not use them as creatively as normal children for producing highly varied utterances (1973, p. 228)

Other studies (Fry, 1967; Rosenthal, 1970; Schulte, 1967; Slegman, 1974; Vogel, 1974) have also shown that children with specific learning disabilities exhibited deficits and delays in oral language. None of these studies, however, has attempted to describe the developmental trends in the oral language of learning disabled children over a wide age range.

CHAPTER III

METHODOLOGY

This study was concerned with the measurement of syntactic maturity and vocabulary richness in the oral language of a learning disabled population. Various aspects of research conducted involving normal children (Ciani, 1974; Fox, 1970; O'Donnell, Griffin, and Norris, 1967) were replicated in this study and the findings were compared with theirs (Appendix A).

Sample Selection

The subjects were 80 children who attended public school classes for the learning disabled in a county in Southwestern Pennsylvania. Fourteen schools within nine school districts contained classes for the learning disabled. These classes, serviced by an Intermediate Unit,* had a total enrollment of 171 students. The children represented four age levels: 7.5 years to 8.11 years, 9.0 years to 10.5 years, 10.6 years to 11.11 years, and 12.0 years to 13.5 years. The mean age for level one was 7.8 years, for level two 9.4 years, for level three 10.9 years, and for level four 12.5 years. The age range was selected based on previous research which found that normal children master

*There are 29 Intermediate Units across the State of Pennsylvania which replaced 66 County superintendent offices. The Intermediate Unit is the middle echelon in the three level system of school organization in Pennsylvania -- The State Department of Education - Intermediate Unit - Local School District. Through the Intermediate Unit local school systems have access to programs which they cannot economically provide for themselves such as classes for exceptional children.

syntactic structures by the age of seven even though development continues after this age (Chomsky, 1969; Hunt, 1970; Lefevre, 1964; Strickland, 1970; Slobin, 1966; Templin, 1957). To be considered for this study the parents had to grant permission by signing a letter of consent (Appendix B) and the child had to agree to participate. Even though all children had been identified as learning disabled they had been placed in two different educational settings. Some of the children were in self-contained classrooms for the learning disabled. The remainder were placed in a resource room for reading and mathematics while being mainstreamed for other subjects and activities. The researcher validated the children's records located in the Administration Office to verify that the state guidelines for placement specified by the Commonwealth of Pennsylvania had been followed. These included: (1) a differential diagnosis by the Supervisor or Director of Special Education or a certified school psychologist, (2) an individual psychological examination, (3) an individual vision, hearing, and neurological screening administered by the proper professionals, and (4) an educational assessment. Any child who has been placed in a class for the learning disabled without proper diagnosis was excluded from this study.

Any child who had articulation problems severe enough to warrant speech therapy was not included in this study. Davis (1937) reported that children with articulation difficulties spoke in shorter sentences, used a limited vocabulary, and lacked spontaneity in their speech. More recently, the results of studies by Menyuk (1964a), Shriner et al. (1969), Vandermark and Mann (1964), using different methods of assessing syntactic complexity, showed that children with severe articulation problems displayed delays in syntactic development.

Furthermore, severe articulation difficulties would interfere with the accuracy of the transcriptions of the oral language samples.

The researcher then applied a learning efficiency formula (see p. 8) to each child's test data. Only those children who had a learning efficiency of 65% and below were considered for this study. Children were then categorized according to age levels appropriate for this study. Finally 80 children, 20 at each age level, were randomly selected.

In this study, there was no attempt to control the sex variable in any systematic manner. Past research has shown that there is no consistent difference between the oral language of girls and boys (Ciani, 1974; Fox, 1970; Harrell, 1957; Loban, 1963; Menyuk, 1964b; O'Donnell, Griffin, and Norris, 1967; Strickland, 1962).

Information concerning the mother or father's occupation obtained from the records in the Administration Office and validated by the researcher with the County Assessment records housed in the County Court House were used to determine the socioeconomic status of the sample population. A positive relationship between language and socioeconomic status has been reported (Bereiter and Englemann, 1966; Brossard and Boll, 1953; Loban, 1963, 1966; McCarthy, 1952; McGrady, 1968; Milner, 1951; Ruddell and Groves, 1968; Sexton, 1961; Templin, 1957). They found that children from middle and higher socioeconomic status families used more complex sentences and had larger vocabularies at an earlier age than low socioeconomic families. The Dictionary of Occupational Titles, Volume II, Definition of Titles (1965) served as the source to classify mother and/or father's occupation for each child.

This classification system contained nine major categories: 0-1. Professional, technical and managerial; 2. Clerical and sales; 3. Service; 4. Farming, fishery, and forestry; 5. Processing; 6. Machine Trades; 7. Bench Work; 8. Structural Work; 9. Miscellaneous. Specific occupations included in each major category appear in Appendix C. This classification scheme did not represent a hierarchical arrangement. Table 1 illustrates the distribution of parental occupations among the major categories.

Table 1

Distribution of Occupational Classifications
of Mothers and Fathers of Children in This Study

Occupational Classification	Total	Percentage
0-1 Professional, technical and managerial	13	14.3%
2 Clerical and sales	10	11.0%
3 Service	11	12.1%
4 Farming, fishery and forestry	0	0%
5 Processing	34	37.4%
6 Machine	4	4.4%
7 Bench work	2	2.2%
8 Structural work	2	2.2%
9 Miscellaneous	15	16.5%

The majority of the parents in the fifth category were laborers involved in processing of steel or coal. Classification nine also contained laborers who were involved in the extraction of coal. These occupational classifications, containing 53.9% of the population, represented parents with similar incomes. The majority of parents in category one were nurses, category two salesmen, and category three barbers or cosmetologists. None of the parents of children involved in this study were on welfare. Even though Table 1 indicates that

the sample population was distributed among the occupational classifications, the range of incomes was relatively narrow.

Procedures for Data Collection

Two films were used to elicit narrative oral language samples. "The Ant and the Dove" and "The North Wind and the Sun" are Aesop fables which are part of the Coronet Language Series. These two films were used in the studies conducted by O'Donnell, Griffin, and Norris (1967) and Fox (1970).

Three rooms were provided by the schools for this study. The films were shown in one room; the other rooms had a table, three chairs, and the tape recording equipment. A tape recorder with a condensed microphone was placed on a chair beneath the table in each room. During the taping, the recorder volume was turned to its highest level so that all words spoken were audible. The chair with the recording equipment was placed directly between the child's chair and the interviewer's chair to direct the speech toward the microphone.

Instruction sheets were written for the interviewers as a means of standardizing the sampling procedure. Introductory remarks to the films and a request to proceed to rooms to tell the story were provided on the first sheet (Appendix D). The second sheet listed procedures to be followed during the collection of the oral language sample and the questions to be asked after the story telling (Appendix D). The interviewers waited approximately five seconds after a child's utterance before going to the next question. This gave the child an opportunity to think and continue his or her response if the child wished to do so (see Fox, 1970).

Interviewers

The collection of the oral language samples involved three people, the investigator who served as an interviewer, an interviewer, and a projectionist, who arranged the rooms, positioned the recording equipment, and showed the films. The interviewer, who was a substitute teacher, was selected by the principal of one school involved in this study. During the conversation in which the investigator extended the invitation to participate in the study, there was discussion about the purpose of this study and her role in the study. She was required to attend two orientation meetings (Appendix E). Results of the observations are as follows: (1) the interviewers quickly established rapport with the children, and (2) they precisely followed the procedures outlined for collecting the oral language samples. Both interviewers exhibited similar physical characteristics (height, weight, hair color and style, age, mode of dress). During the discussion following the session it was decided that the procedure (viewing the films and collecting the data) would take approximately one-half hour and that the space provided was adequate. Based on the results of this session it was decided that another training session was not needed.

Procedures for Data Collection

Two children from the same age level were shown the films at one time. The investigator and the interviewer went to the classroom to meet the children. On the way to the film room, both interviewers spoke informally with the children to relax them. In the film room, each child was given an additional opportunity to speak with the assigned interviewer.

Replicating the procedures and questions as outlined by Fox (1970), the investigator told the children: "We are going to show you a story, called, 'The Ant and the Dove.' It is a cartoon as you have seen on TV and at the movies but it will be different from those you have seen before. There will be no sound. When it is finished, you will be asked to tell the story that you saw. We hope that you will enjoy the movie."

The film, "The Ant and the Dove," was shown without the sound track turned on. At the conclusion of the film the interviewer took the assigned child to the taping room. The interviewer turned on the tape recorder and asked: "Child's name, will you tell me the story you have just seen of 'The Ant and the Dove'?" After the child completed his or her response, the interviewer proceeded to ask: "Would you like to add anything to your story?" At the conclusion of the child's response a final question was asked: "Some people think this film shows that when a good thing is done to one person, he should do something nice also. Can you think of a time when something was done to you or anyone you know - was something nice done in return? Tell me about it." The child was returned to the film room after the response to the question.

Once again, the two children viewed another film, "The North Wind and the Sun," without sound. The children were told: "We are going to show you another story which is about the North Wind and the Sun. When it is finished, you will be asked to tell the story you saw."

At the conclusion of this film, the interviewer took the assigned child to the individual recording room where the child was asked: "Child's name, now that you have seen the movie, 'The North Wind and the Sun,' will you tell me the story?" When the child completed the response, the interviewer asked: "Would you like to add anything to your story?" After the child answered, this question was asked: "Some people think that this film shows that it is better to be kind and gentle, like the Sun, than mean and strong, like the North Wind. Can you tell me of anything that has happened to you or anyone you know that shows it is better to be kind and gentle than to be mean and strong?" After the child responded, the interviewer returned the subject to the film room. The interviewers thanked the children and returned them to their classroom.

Pilot Study

The purpose of the pilot study was to determine the reliability and validity of data collection procedures. These included (1) the ability of the investigator and interviewer to elicit similar oral language samples from the same child, and (2) the appropriateness of the two stimulus films (A - "The Ant and the Dove", B - "The North Wind and the Sun").

Ten children from a learning disabilities resource room were involved in this pilot study. These children were part of the sample population. Nine of the children were male and one was female.

Data were collected on two days one week apart. On the first day each child viewed one film. Five of the children saw film A while

five saw film B. The investigator interviewed half of the children as did the interviewer. On day two the film and the interviewer were alternated for each child. Table 2 illustrates the procedures employed in the pilot study.

Table 2

Pilot Study Procedures

Day 1			Day 2		
Child	Film	Interviewer	Child	Film	Interviewer
1	A	I	1	B	II
2	B	I	2	A	II
3	A	II	3	B	I
4	B	II	4	A	I
5	A	I	5	B	II
6	B	I	6	A	II
7	A	II	7	B	I
8	B	II	8	A	I
9	A	I	9	B	II
10	B	I	10	A	II

The reliability of the oral language samples over a period of time as measured by the total number of words spoken, number of T-units spoken, the average number of words per T-unit, and the corrected type-token ratio was tested in this pilot study. The correlation coefficients were .73 for the total number of words spoken, .62 for the number of T-units spoken, .70 for the average number of words per T-unit, and .61 for the corrected type-token ratio. Given the variability in the themes of the stimuli, the correlation coefficients were considered to be a satisfactory indication of reliability.

The films in this study were used in two of the three comparison studies (Fox, 1970; O'Donnell, Griffin, and Norris, 1967). Uniformity of stimuli across studies controlled the conditions under which the oral language samples were produced.

Procedures for Preparation of Data Analysis

Transcriptions

Following the procedures outlined by Fox, a typist transcribed the tape recordings. The investigator validated all transcripts by checking them against the tape recordings and making the necessary corrections. The corrected transcripts were rechecked by the investigator against the tape recordings and corrections were again made. The corrected transcripts were retyped for the third and final time. The final typescripts were fed into the computer. The computer printout readings were checked against the final transcripts. The data were then quantitatively analyzed for syntactic maturity and vocabulary richness. The final oral language transcripts were prepared to be analyzed for syntactic maturity and vocabulary richness utilizing the Syntactic Density computer program (Golub and Kidder, 1974; Kidder, 1974) and the Vocabulary Intensity Index Analyzer.

Following the procedures outlined by O'Donnell, Griffin, and Norris, as well as Fox and Ciani, no punctuation marks or capital letters were used when transcribing the oral language samples. Contractions and compound words were separated, i.e., "they've" was typed as "they have," "I've" as "i have," "someone" as "some one," etc. In addition, syllables used to represent a positive or negative response were transcribed as "uhuh," "yeow," "huhuh." Questioning expressions were recorded as "huh?" This procedure was consistent in the transcription of all oral language samples and did not influence vocabulary richness measures.

Procedures for Analysis of Data

Two measures of syntactic maturity and two measures of vocabulary richness were applied to the data. The T-unit (one main clause plus a clause subordinate to it) and the Syntactic Density Score were measures of syntactic maturity while the corrected type-token ratio and the Vocabulary Intensity Index were measures of vocabulary richness.

Syntactic Complexity

The Syntactic Density Score (SDS) (Golub and Fredrick, 1970, 1971) incorporated the measures of T-unit length and subordinate clause length that Hunt and others have found useful. Ten variables were identified that highly correlated with teachers' judgments of high quality writing. Decimal weights were determined, by multiple regression and canonical correlation, to specify the amount of influence each variable carried. Appendix F shows a Tabulation Sheet for this formula. After the ten variables were counted (frequency of occurrences) and weighted, the products (subscores) were added. The total was divided by the number of T-units in the sample to arrive at a single Syntactic Density Score (SDS). A grade level conversion table was included.

A complete program written in PL/1 was devised for use on an IBM 370 computer (Golub and Fredrick, 1974; Kidder, 1974). Kidder (1974) compared machine scoring with hand scoring using twelve 200-word samples of graded reading material. The material was scored by a trained rater and validated by a second rater. The same samples were then scored by the computer. The Pearson Product-Moment Correlation Coefficient of the

hand and machine scoring was .96, with the computer scoring being consistently slightly higher. The original syntactic density formula counts only forms of have or be in the auxiliary position whereas the computer counts all forms of have or be. This difference accounts for the slightly higher machine scores.

In preparation, each transcript was punctuated using conventional rules of grammar (Tressler et al., 1960, pp. 309-335) (Appendix G). After the eighty transcripts were punctuated, ten randomly selected unmarked transcripts, were given to a second punctuator to mark using the same rules of grammar. The investigator compared the transcripts. No differences were identified. The computer record cards were fed through the Syntactic Density computer program at Pennsylvania State University. The printout from this computer program showed the text of the language sample and a tabulation sheet for each sample that lists the total number of words spoken by each child (word tokens), the total number of T-units in the oral language sample, and the frequency and subscores on each of the ten linguistic variables (Appendix H). In addition, the printout showed a Syntactic Density Score (the total of the subscores divided by the number of T-units) and a Grade Level Conversion Table on each Tabulation Sheet. Kidder (1974) found this to be a sensitive measure of children's written language with a clear trend for the mean scores to increase with advancing age.

For each oral language sample, number of T-units and average T-unit length were considered to be measures of syntactic maturity. This information was obtained from the computer program printout for the Syntactic Density Score.

Vocabulary Richness

The first measure of vocabulary was the Vocabulary Intensity Index. This index accounted for level of vocabulary, diversity of vocabulary, word building application, and use of multisyllabic words. The investigator discussed the reliability and validity of the Vocabulary Intensity Index with Golub (1977) who supervised the development of the index by Kidder. Golub stated that a thorough library search did not find a more discriminating measuring of vocabulary richness. He believed that the factors being measured in this index were the factors most directly related to vocabulary growth.

To indicate diversity of vocabulary, a count was made of the number of different words used (word types). To estimate the level of vocabulary, the word types were checked against a list of 500 words most frequently encountered by third graders (Otto and Chester, 1972) (Appendix I). The total number of words used that were not on this list was calculated. Suffixes and prefixes were counted. The number of multisyllabic words was indicated. The frequency of occurrence of these variables was summed and divided by the total number of words used (word tokens) to compute the Vocabulary Intensity Index. The Tabulation Sheet for this formula is shown in Appendix J. The VII computer program, written to measure Vocabulary Intensity (Kidder, 1974) required the same encoding conventions and indexing procedures as the Syntactic Density Program. The data were subjected to computer analysis at Pennsylvania State University. The printout of this program showed the oral language sample, the number of word types, number of word tokens, simple type-token ratio, number of words not on the basic word list, number of words having suffixes, and the final vocabulary score (Appendix K).

The second measure of vocabulary richness was the corrected type-token ratio. This ratio consisted of the number of different words used by the subject (word types) divided by the square root of twice the number of words in the sample (word tokens) which allowed for differences in sample size. This ratio was calculated by the investigator.

The investigator discussed the validity of the corrected type-token ratio with Carroll (1977) who introduced the formula in his book Language and Thought (1964). Carroll (1977) indicated that at present he has not developed or discovered a more accurate measure. He encouraged measuring vocabulary richness using the corrected type-token ratio following several procedural suggestions which should increase the validity: (1) use 300 word oral language samples and (2) control the stimulus used to elicit the oral language samples.

CHAPTER IV

ANALYSIS OF DATA

The objective of this study was to compare the data of the four age groups on various measures as they related to each research question. The scores for the children on each measure of vocabulary and syntax are listed in Appendix L. The means and standard deviations were compared by groups for each measure of syntactic maturity and vocabulary richness. Differences among the means have been tested for statistical significance using the one-way analysis of variance method. The Scheffé test has been applied to all comparisons of means after a significance was found on the one-way analysis of variance to locate the main source of significance of the overall F-ratio.

Kirk's (1968) computational procedures (Appendix M) for testing linearity of trends and quadratic trend components were applied to the data. This statistical trend analysis employs a polynomial equation that describes the relationship between the dependent variable and independent variable. In addition, this analysis illustrates whether the dependent variable means are linear or quadratic. In this study a significant linear trend, resulting after a significant analysis of variance, indicates a developmental pattern in the data. A significant quadratic trend shows increasing means followed by decreasing means with age (Appendix M).

Comparisons of syntactic maturity as measured by T-unit length and vocabulary richness as measured by the corrected type-token ratio were made between the data for the Ciani (1974) study, the Fox (1970) study, and the O'Donnell, Griffin, and Norris (1967) study with this present study.

Research Question One. What is the syntactic developmental trend of learning disabled children's oral language at four age levels (7.5 years to 8.11 years, 9.0 years to 10.5 years, 10.6 years to 11.11 years, 12.0 years to 13.5 years) as measured by the number of T-units and the average number of words per T-unit?

Table 3 contains the means and standard deviations for number of T-units at each age level. The data indicate that there was an increase in the means across the first three age levels; however, there was a slight decrease between the third and fourth age levels.

Table 3

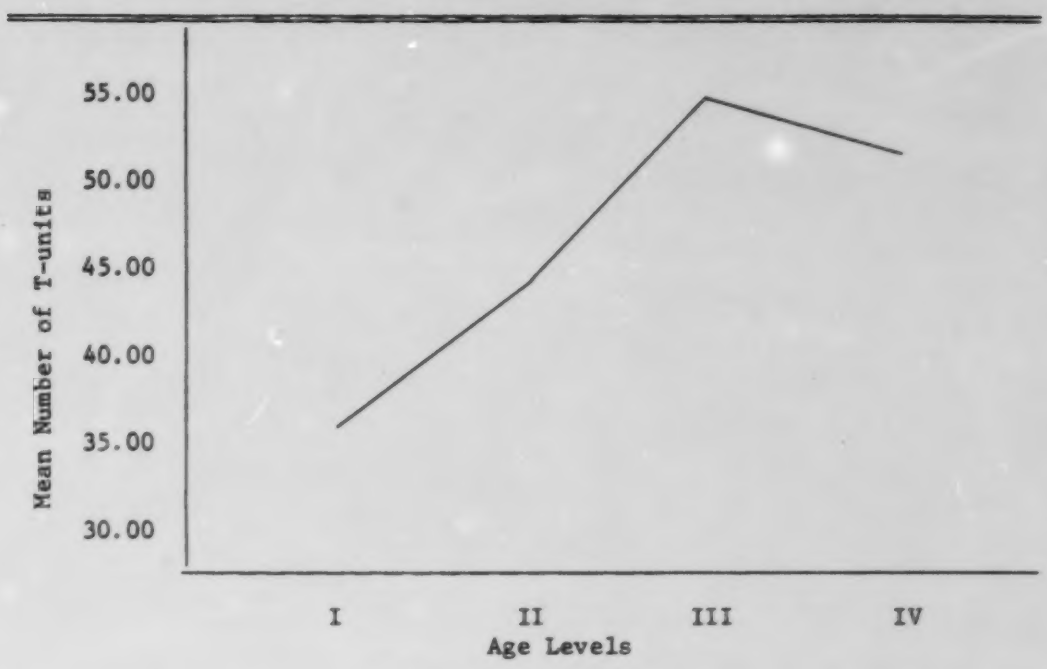
Means and Standard Deviations for T-unit

Age Levels	N	Mean	Standard Deviation
I. 7.5 - 8.11 years	20	35.25	17.34
II. 9.0 - 10.5 years	20	44.25	17.93
III. 10.6 - 11.11 years	20	54.25	22.41
IV. 12.0 - 13.5 years	20	51.50	17.65

In Figure 1, the mean number of T-units are plotted for the groups. The graph shows the upward trend in the data across the first three age levels with a slight decrease at the fourth level.

Figure 1

Mean Number of T-units Across Four Age Levels



I. 7.5 - 8.11 years
II. 9.0 - 10.5 years
III. 10.6 - 11.11 years
IV. 12.0 - 13.5 years

Table 4 presents the results of the one-way analysis of variance and statistical trend analysis for the mean number of T-units at four age levels.

Table 4 indicates a statistically significant difference in the mean scores of the four groups as evidenced by the F-ratio of 4.022. Further analysis was warranted as to which differences contributed to the significance. The Scheffé method of multiple comparisons applied to the data revealed that the mean for group one was significantly different from the mean for group three. This accounted for the main source of significance of the overall F-ratio. None of the other differences was significant.

Table 4

Analysis of Variance and Trend Analysis for
Number of T-units Across Age Levels

Source	df	Mean Squares	F
Between Groups	3	1443.65	4.022***
Linear Trend	1	3451.56	9.616***
Quadratic Trend	1	690.31	1.923
Within Groups	76	358.95	

*** Significant at the .01 level

The statistical trend analysis revealed that there was a significant positive, linear trend in the data. That is, the means for the dependent variable (T-unit) were associated with changes in the independent variable (age level). In Figure 1 the data indicate that the means increased across the first three age levels with a slight decrease at the fourth level.

Number of Words per T-unit

Table 5 summarizes the means and standard deviations for length of T-unit at each age level. The data indicate that there was a slight increase at each age level relative to the mean scores. The largest increase occurred between the second and third levels.

Table 5

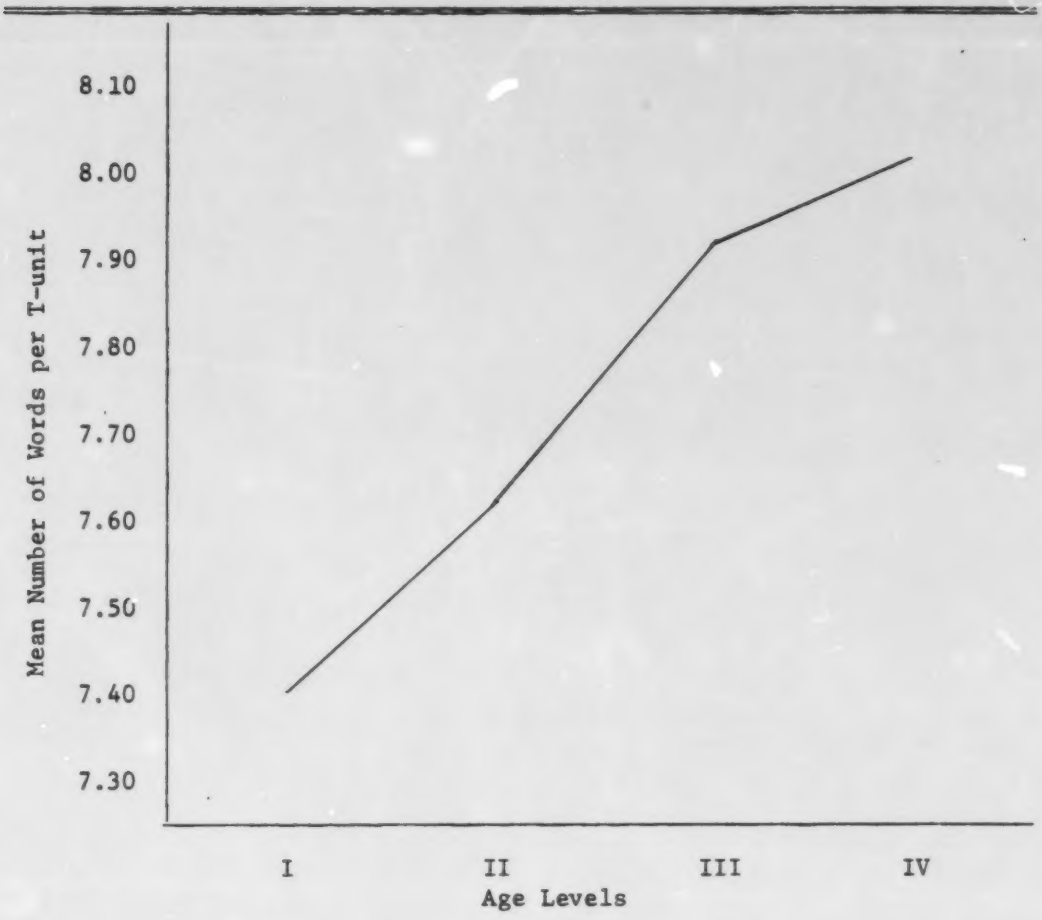
Means and Standard Deviations for the
Number of Words per T-unit

Age Levels	N	Mean	Standard Deviation
I. 7.5 - 8.11 years	20	7.40	1.01
II. 9.0 - 10.5 years	20	7.61	0.94
III. 10.6 - 11.11 years	20	7.91	0.66
IV. 12.0 - 13.5 years	20	8.02	0.87

Figure 2 represents the mean T-unit length across four age levels. Slight increases in the means are shown with advancing age.

Figure 2

Mean Number of Words per T-unit
Across Four Age Levels



I. 7.5 - 8.11 years
II. 9.0 - 10.5 years
III. 10.6 - 11.11 years
IV. 12.0 - 13.5 years

Table 6 presents the results of the one-way analysis of variance and trend analysis across four age levels for the mean number of words per T-unit.

The results show a significant difference in the mean number of T-units spoken across the four age levels at the .10 level. The Scheffe test, when applied to these data, revealed no difference between all possible pairs of means. However, the difference between an average of means, for example, the average of means for groups one and two versus the average of means for groups two and three, was contributing to the significance of the overall F-ratio.

Table 6

Analysis of Variance and Trend Analysis
T-unit Length Across Four Age Levels

Source	df	Mean Squares	F
Between Groups	3	1.61	2.168**
Linear Trend	1	4.72	6.342***
Quadratic Trend	1	0.04	0.067
Within Groups	76	0.74	

* Significant at the .10 level
*** Significant at the .01 level

The statistical trend analysis, as reported in Table 6, indicated a significant, positive, linear trend in the data. Figure 2 shows that slight increases in the means are associated with changes in age.

Research Question Two. Is the developmental trend in syntactic maturity for learning disabled children at four age levels (7.5 years to 8.11 years, 9.0 years to 10.5 years, 10.6 years to 11.11 years, 12.0 years to 13.5 years) as measured by T-units similar to that found in previous research conducted with normal children?

Table 7 contains the means for this present study and the comparison studies. The O'Donnell, Griffin, and Norris study, the Fox study, and the present study showed increases in the mean number of words per T-unit with advancing age. O'Donnell, Griffin, and Norris reported significant increases in mean T-unit length between groups III and IV (10.2 to 14.6 years). Fox found a statistically significant increase in mean length of T-units between groups II and III (7.5 to 10.33 years). The present study showed a significant difference in the means across the four age levels.

Table 7

A Comparison of Mean T-unit Length
Across Four Age Levels

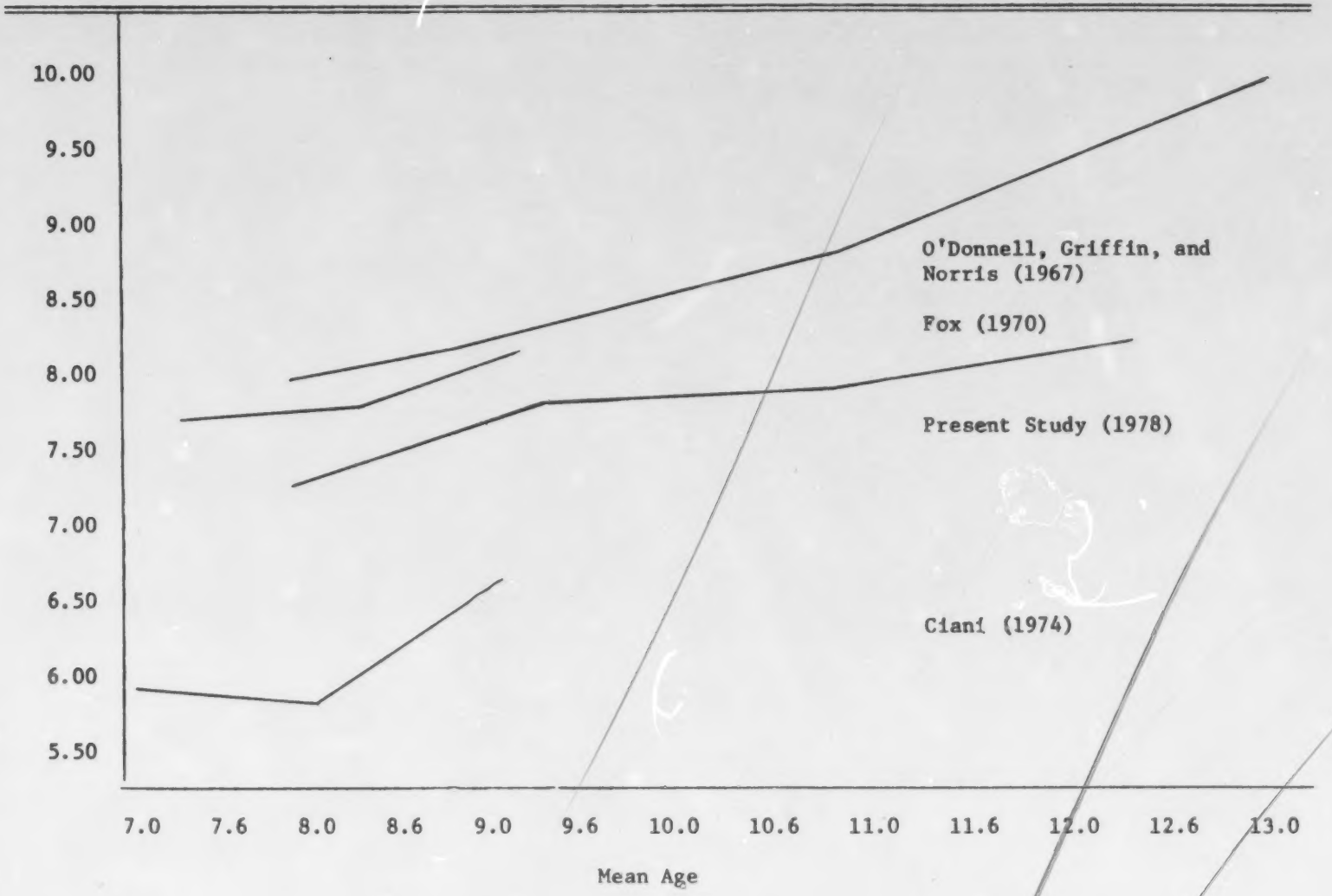
Study	Group I		Group II		Group III		Group IV	
	Mean Age	Mean T-unit	Mean Age	Mean T-unit	Mean Age	Mean T-unit	Mean Age	Mean T-unit
O'Donnell, Griffin, and Norris (1967)	7.11	7.97	8.9	8.33	10.10	8.73	13.0	9.80
Fox (1970)	7.3	7.66	8.4	7.80	9.3	8.16		
Ciani (1974)	7.0	5.90	8.0	5.89	9.1	6.53		
Present Study (1978)	7.8	7.34	9.4	7.61	10.9	7.91	12.5	8.02

Figure 3 indicates that the trends described in the present study were generally parallel to the findings of Fox (1970) and O'Donnell, Griffin, and Norris (1967), with the present study showing slightly lower means at each age level. Similar advances occurred between the first and second groups in this study and the O'Donnell, Griffin, and Norris study, while the trend reported by Fox showed a

slow rate of lengthening T-units between these age groups. The three comparison studies showed a similar rate of increase between the second and third groups. O'Donnell, Griffin, and Norris reported substantial acceleration in rate of lengthening T-units between the third and fourth groups whereas this present study observed relatively little growth.

Figure 3

Comparison of the Mean Length of T-unit Across Four Age Levels



It should be noted that in the Ciani study the mean T-unit length was considerably lower than the means reported in previous research and this present study. Ciani (1974) hypothesized that the smaller T-units reflected the use of different stimulus material, different procedures for data collection, and a different population from which the sample was randomly selected. One film, The Daisy, was used to elicit the oral language samples which were collected by Ciani himself whereas the other studies used two films and more than one interviewer. The sample population in the Ciani study consisted of white middle-class rural children. O'Donnell, Griffin, and Norris (1967) as well as Fox (1970) randomly selected their populations from white middle-class urban areas. The population in the present study consisted of urban and rural white middle-class learning disabled children.

Research Question Three. What is the syntactic developmental trend of learning disabled children's oral language at four age levels (7.5 years to 8.11 years, 9.0 years to 10.5 years, 10.6 years to 11.11 years, and 12.0 years to 13.5 years) as measured by the Syntactic Density Score?

Table 8 contains the means and standard deviations for the Syntactic Density Score. The data reveal no increase in means between the first and second age levels, an increase between groups two and three, then a slight decrease at the fourth age level.

Table 8

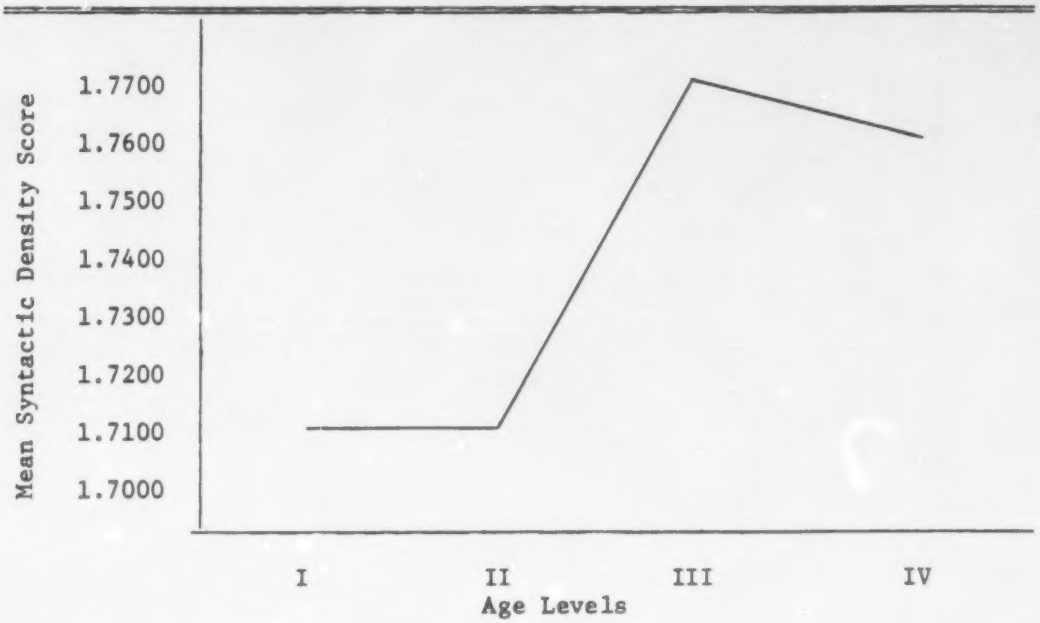
Means and Standard Deviations for the Syntactic Density Score

	Age Levels	N	Mean	Standard Deviations
I.	7.5 - 8.11 years	20	1.71	0.32
II.	9.0 - 10.5 years	20	1.71	0.32
III.	10.6 - 11.11 years	20	1.77	0.23
IV.	12.0 - 13.5 years	20	1.76	0.34

Figure 4 illustrates the fluctuation in the mean Syntactic Density Scores. The pattern exhibited did not discriminate between the age levels.

Figure 4

Mean Syntactic Density Score Across Four Age Levels



I. 7.5 - 8.11 years
II. 9.0 - 10.5 years
III. 10.6 - 11.11 years
IV. 12.0 - 13.5 years

Table 9 summarizes the results of a one-way analysis of variance and statistical trend analysis for the Syntactic Density Score

There was no significant difference in the means between the age levels. The Syntactic Density Score represented a single score based on the arbitrary weighting of ten variables considered to be highly correlated with teachers' judgments of high quality writing. Some of the variables included in this formula, such as number of modals, number of be and have forms, and number of adverbs of time, are directly related to the subject matter of the stimulus. Furthermore, the Syntactic Density Score was developed to analyze the written language of children and has never been applied to the spontaneous oral language samples. Previous research (Kidder, 1974) on the written language of normal children revealed a tendency for the Syntactic Density Score to increase between the ages of six and eight, seven and nine, and ten and twelve. The Syntactic Density Score appeared therefore to be an accurate measure when applied to written language samples of normal children; however, the obtained results did not substantiate this finding for oral language of learning disabled children.

No significant trends were found in the data. This finding indicated that the developmental pattern was neither linear nor quadratic.

Table 9

Analysis of Variance and Trend Analysis for
Syntactic Density Scores Across Four Age Levels

Source	df	Mean Squares	F
Between Groups	3	0.02	0.190
Linear Trend	1	0.07	0.392
Quadratic Trend	1	0.00	0.016
Within Groups	76	0.09	

Research Question Four. Does the average total word count differ at each age level for learning disabled children?

Table 10 contains the means and standard deviations for total word count. The data reveal increases across the first three age levels with a slight decrease at the fourth level. The total word count of the language samples ranged from 70 to 931 words (2.5% were under 100 words, 17.5% under 200 words, 30% under 300 words, and 50% over 300 words).

Table 10

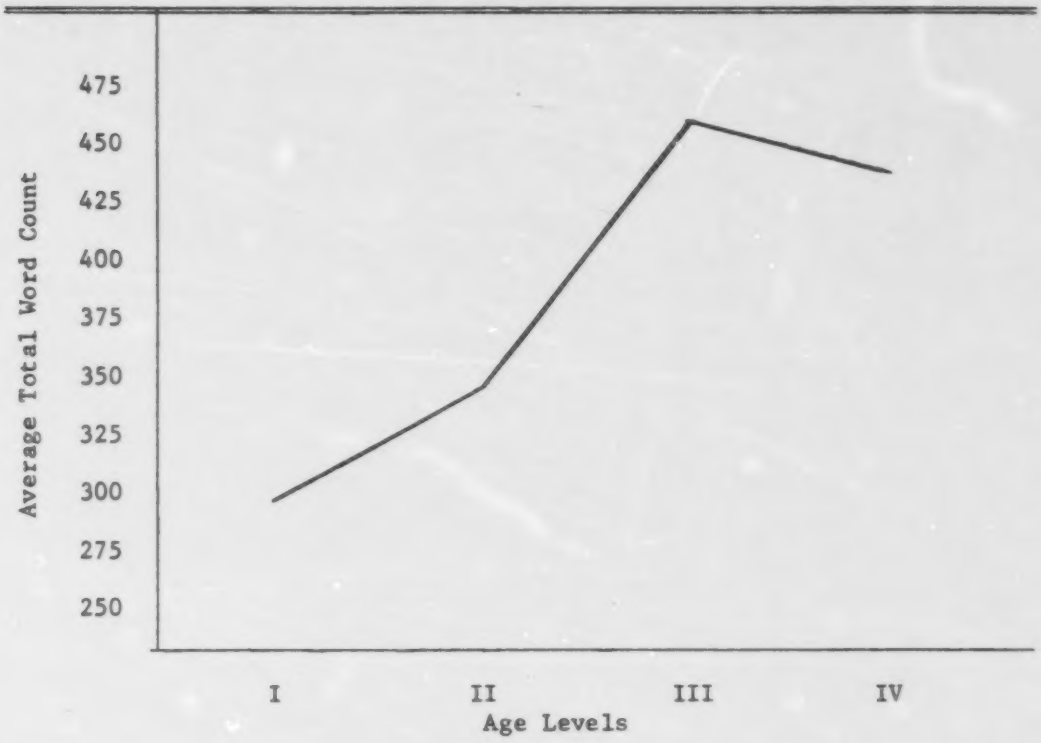
Means and Standard Deviations for the
Average Total Word Count

Age Levels	N	Mean	Standard Deviation
I. 7.5 - 8.11 years	20	279.40	147.69
II. 9.0 - 10.5 years	20	349.10	156.32
III. 10.6 - 11.11 years	20	460.45	195.79
IV. 12.0 - 13.5 years	20	434.40	140.86

In Figure 5, the means are plotted for average total word count. The figure shows an increase in means across the first three age levels with a slight decrease at the fourth level.

Figure 5

Average Total Word Count Across Four Age Levels



I. 7.5 - 8.11 years
II. 9.0 - 10.5 years
III. 10.6 - 11.11 years
IV. 12.0 - 13.5 years

Table 11 presents a summary of an analysis of variance and trend analysis for average total word count at four age levels.

Table 11 indicates that there is a significant difference in the means as evidenced by an F-ratio of 5.237. The Scheffé test used to test all differences between means revealed that the means for groups one and three were significantly different as were the means for groups one and four.

Table 11

Analysis of Variance and Trend Analysis for
Average Total Word Count Across Four Age Levels

Source	df	Mean Squares	F
Between Groups	3	136692.84	5.237***
Linear Trend	1	332179.31	12.727***
Quadratic Trend	1	45840.31	1.756
Within Groups	76	26100.11	

*** Significant at the .01 level

The significant F-ratio of 12.727, as reported in Table 11, indicated a significant, positive, linear trend in the data. That is, increases in the means were associated with changes in age. According to the data, there was a slight decrease in the average word length of the language samples at the fourth age level. As reported, there was no statistically significant difference in the means between the third and fourth age levels; therefore, the data did not depart from linearity.

Research Question Five. What is the developmental trend in the oral language of learning disabled children at four age levels as measured by the corrected type-token ratio?

Table 12 contains the means and standard deviations for the corrected type-token ratio. The data indicate that the mean corrected type-token ratios increased across the first three age levels with no evidence of growth between the third and fourth levels.

Table 12

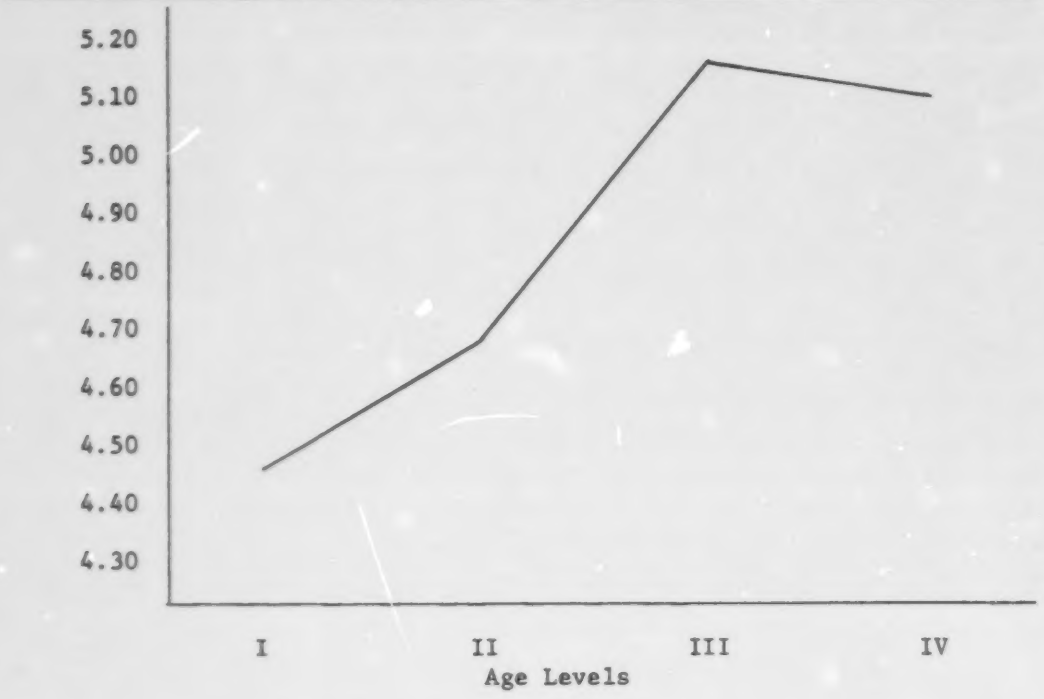
Means and Standard Deviations for the Corrected Type-Token Ratio

Age Levels	N	Mean	Standard Deviation
I. 7.5 - 8.11 years	20	4.45	0.58
II. 9.0 - 10.5 years	20	4.69	0.72
III. 10.6 - 11.11 years	20	5.15	0.82
IV. 12.0 - 13.5 years	20	5.10	0.86

In Figure 6 the means for the corrected type-token ratio are plotted. The graph shows an upward trend during the early years followed by a plateau between the oldest age groups. This finding indicated that vocabulary, as measured by the corrected type-token ratio, tended to increase to age 11.11 then began to level off.

Figure 6

Mean Corrected Type-Token Ratio
Across Four Age Levels



I. 7.5 to 8.11 years
II. 9.0 to 10.5 years
III. 10.6 to 11.11 years
IV. 12.0 to 13.5 years

Table 13 presents a summary of the one-way analysis of variance and trend analysis for the corrected type-token ratio.

Table 13 indicated that there was a significant difference in the means across the four age levels. The Scheffé test when applied to these data revealed no difference between all possible pairs of means. However, the difference between an average of means was contributing to the significance of the overall F-ratio.

Table 13

Analysis of Variance and Trend Analysis for Corrected Type-Token Ratio Across Four Age Levels

Source	df	Mean Squares	F
Between Groups	3	2.23	0.0253**
Linear Trend	1	5.76	0.0047***
Quadratic Trend	1	0.42	0.4337
Within Groups	76	0.6787	

** Significant at .05 level
*** Significant at .01 level

There was a significant linear trend in the data which indicated that changes in the corrected type-token ratio were associated with age.

Research Question Six. Is the developmental trend in the oral language of learning disabled children at four age levels as measured by the corrected type-token ratio similar to that found in previous research conducted with normal children?

Fox (1970) found increased means with advancing age. Like the Fox study, the data from the present study indicated a significant difference between the means. Unlike the Fox study and this present study, Ciani (1974) found that differences between the means were not significant; however, he found a significant linear trend in the data. Ciani computed the type-token ratios on rather small language samples elicited from one film which tends to make the ratios quite variable. The ratio was found to be more reliable when computed on large language samples elicited from rather diverse stimulus materials (Carroll, 1977).

Research Question Seven. What is the developmental trend in the oral language of learning disabled children at four age levels as measured by the Vocabulary Intensity Index?

Table 14 presents the means and standard deviations for the Vocabulary Intensity Index across the four age levels. The data indicate that there was a decrease in the mean scores with increasing age. To compute the Vocabulary Intensity Index, a count was made of the number of different words spoken, number of words not on a basic word list, number of words with affixes, and the number of multisyllabic words. These variables were summed and the total was divided by the total number of words in the language sample. During the development of the vocabulary index, no attempt was made to statistically assign weights to each variable according to its degree of contribution to vocabulary intensity. In addition, the Vocabulary Intensity Index was developed to analyze written language samples of children. Prior to this research, the instrument was not applied to oral language samples. Previous research (Kidder, 1974) on the written language of normal children found the means to increase between the ages of 5.9 years to 9.9 years, regress slightly between 9.9 years to 10.8 years, then curve upward from 10.9 years to 12.8 years. The Vocabulary Intensity Index, therefore, appeared to be an accurate measure when applied to written language; however, the obtained results did not substantiate this finding for oral language of learning disabled children.

Table 14

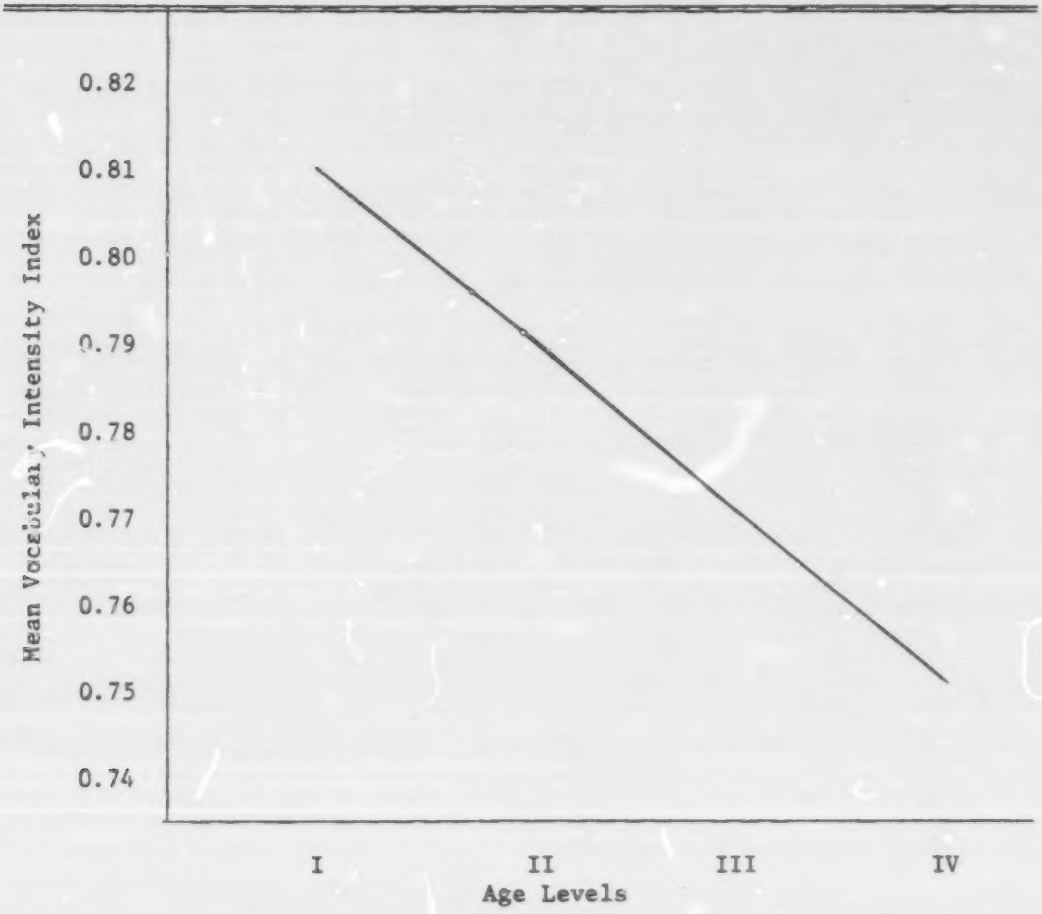
Means and Standard Deviations for Vocabulary Intensity Index Across Four Age Levels

Age Levels	N	Mean	Standard Deviation
I. 7.5 - 8.11 years	20	0.81	0.70
II. 9.0 - 10.5 years	20	0.79	0.66
III. 10.6 - 11.11 years	20	0.77	0.63
IV. 12.0 - 13.5 years	20	0.75	0.60

Figure 7 represents the mean Vocabulary Intensity Index across four age levels. The mean Vocabulary Intensity Index decreased with increasing age.

Figure 7

Means for Vocabulary Intensity Index
Across Four Age Levels



I. 7.5 to 8.11 years
II. 9.0 to 10.5 years
III. 10.6 to 11.11 years
IV. 12.0 to 13.5 years

Table 15 presents the results of the one-way analysis of variance and trend analysis for the Vocabulary Intensity Index.

The data in Table 15 indicated that there was a statistically significant difference between the means of the Vocabulary Intensity Index across age levels. There was a significant linear trend in the data, that is, for these data the means gradually decreased with increasing age.

Table 15

Analysis of Variance and Trend Analysis for the Vocabulary Intensity Index Across Four Age Levels

Source	df	Mean Squares	F
Between Groups	3	0.01	1.49***
Linear Trend	1	0.04	4.45**
Quadratic Trend	1	0.00	0.00
Within Groups	76	0.00	

** Significant at the .05 level
*** Significant at the .10 level

Research Question Seven (a). What is the developmental trend in the oral language of learning disabled children at four age levels as measured by the number of different words spoken (word types)?

Table 16 presents the means and standard deviations for the number of word types across age levels. The results showed an increase in the means across three age levels with a slight decrease between the third and fourth levels.

Table 16

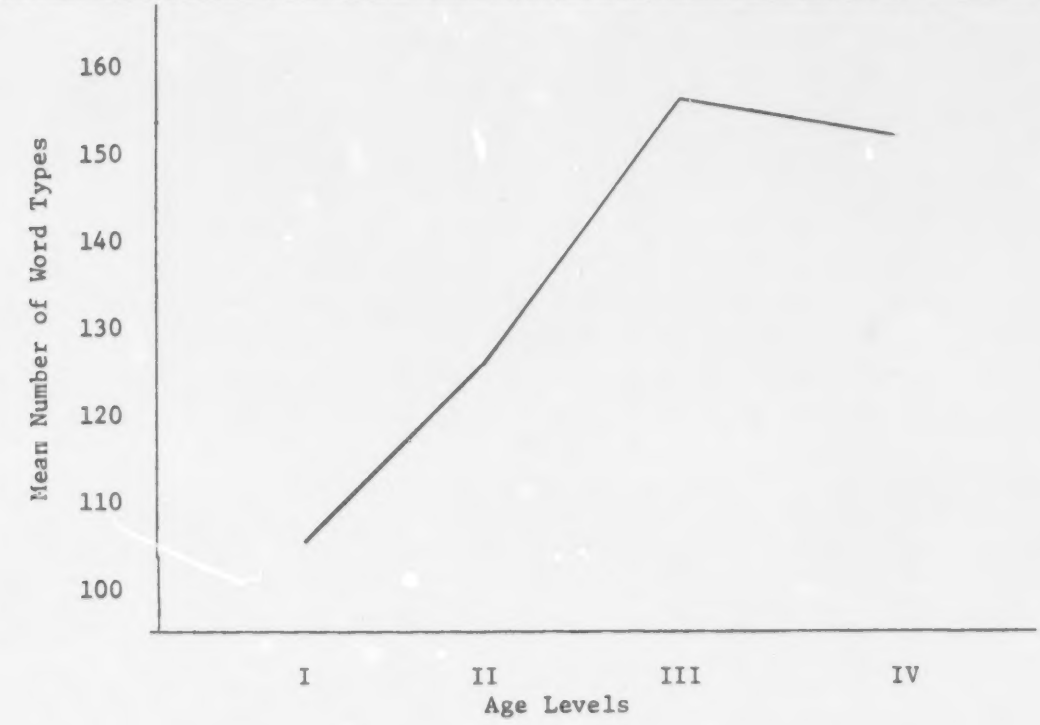
Means and Standard Deviations for the Number of Word Types

Age Levels	N	Mean	Standard Deviation
I. 7.5 - 8.11 years	20	105.90	46.87
II. 9.0 - 10.5 years	20	124.75	49.55
III. 10.6 - 11.11 years	20	156.60	60.31
IV. 12.0 - 13.5 years	20	150.15	46.99

Figure 8 shows the trend in the data across the four age levels. The graph shows an upward trend across three age levels with a slight decrease between the third and fourth levels.

Figure 8

Mean Number of Word Types Across Four Age Levels



I. 7.5 - 8.11 years
II. 9.0 - 10.5 years
III. 10.6 - 11.11 years
IV. 12.0 - 13.5 years

Table 17 contains the results of a one-way analysis of variance. The data indicate a statistically significant difference in the means across age levels. The Scheffé test applied to the data revealed a significant difference in the means between age levels one and three.

Table 17

Analysis of Variance and Trend Analysis for
Word Types Across Four Age Levels

Source	df	Mean Squares	F
Between Groups	3	10975.0984	4.179***
Linear Trend	1	27093.1599	10.317***
Quadratic Trend	1	3250.4500	1.219
Within Groups	76	2626.0908	

*** Significant at the .01 level

An F-ratio of 10.317 indicated that there was a linear, positive, and significant trend in the data. Across age levels one through three there was an implied linear rate of increase in average number of word types.

Research Question Seven (b). What is the developmental trend in the oral language of learning disabled children as measured by the simple type-token ratio?

Table 18 contains the means and standard deviations for the simple type-token ratio. The data reveal decreasing means with increasing age. The simple type-token ratio is a composite measure reflecting both size of vocabulary and diversity. These two parameters can in theory be independent, though in practice they are probably correlated. The simple type-token ratio, therefore, has been reported to decrease with increasing sample size, "because fewer and fewer of the words will not have occurred in the samples already counted" (Carroll, 1964, p. 54).

Table 18

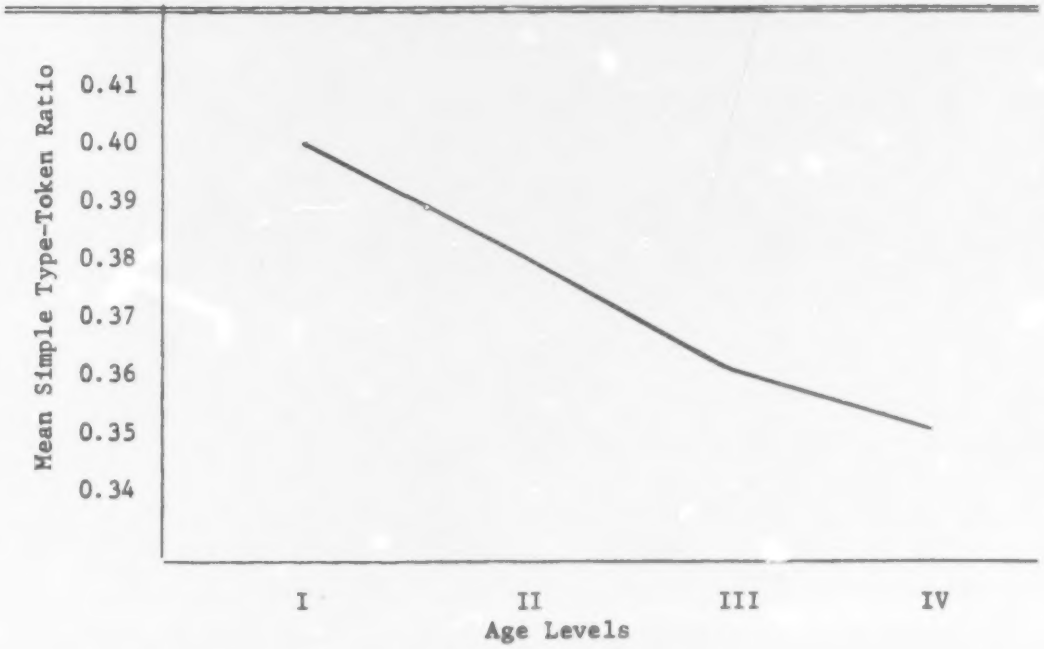
Means and Standard Deviations for
Simple Type-Token Ratio

	Age Levels	N	Mean	Standard Deviation
I.	7.5 - 8.11 years	20	0.40	0.06
II.	9.0 - 10.5 years	20	0.38	0.06
III.	10.6 - 11.11 years	20	0.36	0.06
IV.	12.0 - 13.5 years	20	0.35	0.03

Figure 9 represents the trend in the data across the four age levels. Decreases in the means with increasing age indicated that language sample size increased across the four age levels causing the ratio to decrease. Increasing language sample size with age was evidenced in this study (see research question 4).

Figure 9

Mean Simple Type-Token Ratios Across Four Age Levels



I. 7.5 to 8.11 years
II. 9.0 to 10.5 years
III. 10.6 to 11.11 years
IV. 12.0 to 13.5 years

Table 19 summarizes the results of a one-way analysis of variance and trend analysis for the simple type-token ratio across the age levels. The data revealed that there was a statistically significant difference in the means between the age levels. The Scheffe' test revealed no difference between all pairs of means; hence, an average of means was contributing to the significance of the overall F-ratio.

The statistical trend analysis indicated a significant linear trend. Changes in the mean simple type-token ratio were associated with changes in age level. For these data, ratios decreased with increasing age.

Table 19

Analysis of Variance and Trend Analysis for
Simple Type-Token Ratios Across Four Age Levels

Source	df	Mean Squares	F
Between Groups	3	0.01	3.017**
Linear Trend	1	0.03	8.479***
Quadratic Trend	1	0.00	0.439
Within Groups	76	0.00	

** Significant at the .05 level
*** Significant at the .01 level

Summary

A syntactic developmental pattern was observed as measured by the number of T-units, mean length of T-unit, and total word count. There was a significant difference in the means and a significant linear trend in the data for all three measures of syntax.

A syntactic developmental trend was not observed as measured by the Syntactic Density Score. There was no significant difference in the

mean scores across the age levels and no significant trend was found in the data.

A vocabulary developmental pattern was observed as measured by the corrected type-token ratio and number of word types spoken. There was a significant difference in the means and a significant linear trend in the data for both measures.

A vocabulary developmental trend did not exist as measured by the Vocabulary Intensity Index and simple type-token ratio. The mean scores for both measures decreased with increasing age.

CHAPTER V

SUMMARY, FINDINGS, DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS FOR FUTURE RESEARCH

Summary

The past decade has witnessed an increasing number of studies attending to vocabulary and language maturity. Some of these studies analyzed oral language, others written language, while a few included both oral and written discourse. Several of the studies which looked at spontaneous oral language were directly related to this present research. O'Donnell, Griffin, and Norris (1967), for example, studied the oral language of children from kindergarten through seventh grade. This research team described the syntactic developmental pattern of urban white middle-class children. Fox (1970) specifically studied the developmental trends of vocabulary and syntax in the oral language of kindergarten, first, second, and third grade children from a midwestern city. Ciani (1974) replicated various aspects of the Fox study with white middle-class children in the primary grades from a small rural community. These researchers have made major contributions to our understanding of the language development of normal children.

There was a question, however, whether these findings with normal children would be generalizable to a population of learning disabled children. In a population sample of learning disabled children, what

is the developmental trend in their language? How does it compare to the trend found in studies dealing with normal children? Are the findings the same when measured by different instruments? These are some of the questions looked at in this study which involved 80 children in the learning disabled classrooms in schools in a southwestern Pennsylvania county. For purposes of this study, the 80 children (who were enrolled in 16 learning disabilities classrooms in 14 schools) represented four age levels; 7.5 to 8.11 years, 9.0 to 10.5 years, 10.6 to 11.11 years, and 12.0 to 13.5 years. To obtain the language samples, two children at one time were shown stimulus films without sound. "The Ant and the Dove" and "The North Wind and the Sun" are two films included in the Coronet Language Series. At the conclusion of each Aesop fable film, interviewers asked a child to individually respond to questions pertaining to the films. Their responses were recorded, transcribed, and verified by the investigator who, with another person, conducted the interviews. These were the same films used in the studies by Fox (1970) and O'Donnell, Griffin, and Norris (1967). To these language samples were applied the T-unit and syntactic density formula as measures of syntactic maturity and the corrected type-token ratio and Vocabulary Intensity Index as measures of vocabulary richness. A one-way analysis of variance, the Scheffé test, and a trend analysis (Kirk, 1968) were the statistics used to seek answers to the research questions.

Findings

The findings of this study are summarized as follows:

1. A developmental pattern of syntactic maturity existed as measured by the number of T-units and the average number of words per T-unit. There was a significant difference in the mean number of T-units spoken and the mean length of T-units across the four age levels. The statistical trend analysis (Kirk, 1968) revealed a significant, positive, and linear trend in the data.

2. A comparison of the syntactic developmental trend of learning disabled children and normal children as measured by length of T-unit revealed that normal children experience periods of rapid growth while learning disabled children exhibit gradual progress in their control of syntax throughout the age levels.

3. There was no observable developmental pattern of syntactic maturity as measured by the Syntactic Density Score.

4. A syntactic developmental pattern existed as measured by the total number of words spoken (word tokens). There was a significant difference between the means across age levels. A trend analysis (Kirk, 1968) revealed a significant, positive, linear trend in the data.

5. A developmental pattern of vocabulary richness existed as measured by the corrected type-token ratio. There was a significant difference in the mean ratios across

age levels. A statistical trend analysis (Kirk, 1968) revealed a significant, positive, linear trend in the data.

6. There was no observable vocabulary developmental patterns as measured by the Vocabulary Intensity Index and simple type-token ratio.

7. There was a vocabulary developmental trend as measured by the number of different words spoken (word types). There was a significant difference in the means. A trend analysis (Kirk, 1968) revealed a significant, positive, and linear trend in the data.

Conclusion

There was a developmental trend in the oral language of learning disabled children from 7.5 to 13.5 years. When compared to the development of normal children, the patterns of growth were somewhat different. Learning disabled children exhibited gradual control of vocabulary and syntax while normal children showed periods of rapid growth during the primary and intermediate grades.

Discussion

Syntactic Maturity

A syntactic developmental pattern as measured by T-units was observed. There appeared to be a gradual increase in the children's productive control of syntax. In contrast, normal children tended to show periods of rapid growth at grade range extremities, e.g., between kindergarten and first grade (Fox, 1970; O'Donnell, Griffin, and Norris, (1967), between first and second grade (Ciani, 1974), and between fifth and seventh grade (O'Donnell, Griffin, and Norris, 1967). The contrast between the oldest age groups (10.6 - 13.5 years) in this study was not as striking as the difference observed by O'Donnell, Griffin, and Norris between fifth and seventh graders (10.2 to 14.6 years). The observed difference leads one to ask -- what would be the developmental trend if the age range of the learning disabled children had been extended to include 14, 15, and 16 year olds? Would the developmental trend begin to approximate the marked increase in T-unit length at the upper age levels as reported by O'Donnell, Griffin, and Norris? Would the observed difference between the comparison study and this study become greater at the older age levels?

A syntactic developmental pattern was not observed when the syntactic density formula was applied to the data. The results of the study revealed that several of the variables in the formula are directly related to the stimulus subject matter and the interview questions. The inclusion of three variables in a language sample, that is, number of modals (will, shall, can, may, must, would ...), number of _be_ and _have_ forms in the auxiliary, and number of adverbs of time (when, then, once,

while ...), for example, depends upon time related stimulus materials and questions. Therefore, the condition under which the language samples are produced should provide the children with the opportunity to use the various syntactic structures included in the density formula. Perhaps open-ended films followed by questions which ask the children to draw conclusions and predict outcomes would be more appropriate when applying the density formula.

It should also be noted that the syntactic density formula was developed and tested on written discourse. When applied to written language samples, the Syntactic Density Score increased with age. Previous research has shown that differences existed in the development of syntax between oral and written language at differing age levels (O'Donnell, Griffin, and Norris, 1967, p. 81-82). Several of the syntactic items included in the syntactic density formula based on teachers' judgment of high quality writing were not found to be as frequently used in oral expression. Participles, for example, were used with significantly greater frequency in the writing of fifth and seventh grade children (10.2 to 14.6 years). Similarly, gerund phrases occurred significantly more often in written than oral discourse. Finally, the number of subordinate clauses per T-unit was higher in written language for children in grades 3, 5, and 7 (7.8 to 14.6 years).

Vocabulary Richness

The application of the Vocabulary Intensity Index to the oral language samples resulted in an unexpected trend. The means decreased with increasing age. The vocabulary index was utilized in this study because it would yield a single vocabulary score plus provide information

about factors that contributed to the score. The results of the study revealed several aspects of the vocabulary formula which should be considered for future usage. Number of word types, for example, appeared to be dependent on the stimulus subject matter, especially since it was necessary for the children to speak repeatedly about certain persons, things, or ideas. The continuous repetition of nouns throughout the language sample also tended to limit the number of word types spoken that were not on the basic 500-word frequency list included in the index. Similarly, words with affixes were only used as needed to respond to questions relating to the stimulus situation. It was difficult to say whether the stimulus films and interview questions provided little opportunity to use several of the variables included in the formula or whether the language samples represented the true pattern of vocabulary development. In addition, the scores tended to fluctuate since the Vocabulary Intensity Index does not account for differences in language sample size.

Furthermore, the Vocabulary Intensity Index, like the syntactic density formula, was developed and tested on written language samples of normal children (Kidder, 1974). Special attention should be called to the vocabulary developmental trends reported by Kidder. She found that the mean scores for normal children fluctuated. Development increased between the ages of 5.9 to 9.9 years, regressed slightly between 9.9 years to 10.8 years, then curved upward from 9.9 years to 10.8 years. As previously indicated, the mean scores in the present study decreased throughout the age range (7.5 to 13.5 years). It appears that there is a need to continue the present study with older

learning disabled children (14, 15, 16 year olds) to see if the trend begins to curve upward at the older age levels.

The findings resulting from application of the Vocabulary Intensity Index to the data lead to the ultimate questions: Would the findings of this study be the same if population sample size at each age level were larger? Would the findings be the same if older children were included in the sample population? Would the findings be the same if several of the variables included in this formula were weighted to increase their discriminatory power? Would the findings be the same if the content of the stimulus material was different? It cannot be said with complete confidence that the findings would be the same. Similarly, one cannot apply the simple type-token ratio (number of word types divided by the number of word tokens) with confidence since, like the Vocabulary Intensity Index, the simple type-token ratio is dependent upon language sample size and the nature of the stimulus material.

The corrected type-token ratio (Carroll, 1964) (the number of word types divided by the square root of twice the number of word tokens), however, appeared to be a measure of vocabulary that could be used with confidence since it attempted to account for differences in language sample size. Word frequency distributions have two parameters which are related, one for size of vocabulary (word tokens) and one for diversity (word types). Dividing the word types by twice the square root of the word tokens, to compute the corrected type-token ratio, decreases the numerical distance between the number of words spoken among the language samples. Before applying the corrected type-token ratio, two factors should be considered. First, the language sample size should be large, certainly 300 or more words. Computing the ratio on a small number of word tokens would make the measure quite variable. A further consideration is that the ratio is dependent upon

the nature of the stimulus material. The ratio, therefore, would be most reliable when computed on language samples produced using rather diverse texts.

Characteristics of the Sample Population

In an effort to further define the sample population for this study, a learning efficiency formula (actual achievement divided by expected achievement multiplied by 100) was applied to each child's educational assessment data. The ratios ranged from 30% to 65%. It is interesting that a child who, in this study, received high scores on the measures of syntax and vocabulary had a learning efficiency ratio of 50% while some of the others who scored low on syntax and vocabulary measures had ratios ranging from 60% to 65%. The results obtained raised the question as to whether there were two types of children involved in this study. Were there children with reading problems who also experienced language difficulties? Were there children with reading problems who did not experience language difficulties? Increasing the population sample size, 40 at each age level, might increase the probability of obtaining an evenly distributed group of children at each level. An additional consideration would be to further refine the guidelines for placement into classes for the learning disabled. After clarification, the application of a quantitative definition, such as a learning efficiency ratio, should result in a fairly homogeneous sample of children.

Methodological Considerations

The stimulus films used in the study had the advantage of controlling the conditions under which the language samples were produced and limiting the personal interaction between the child and interviewer; however, they did not stimulate all children to produce large language

samples. The first film-interview situation appeared to be a learning situation for some children. Once the process was understood the children tended to relax and be more verbal. This was evidenced by a general tendency for the children to produce larger language samples after viewing the second film. This finding was not the result of the content of the second film since the pilot study, in which the films were alternated, produced similar results. Increasing the number of films or providing the children with a practice session prior to the collection of the data might result in larger language samples (over 300 words) for all children.

An additional consideration might be to ask specific questions relating to the films, avoiding those that require one-word responses. Specific questions might provide a more structured interview, helping some of the children organize their thoughts and sequence events.

It should also be noted that the results of this study were compared to previous research conducted involving normal children. However, some of the statistical results from the past research were unavailable. The inclusion of a control group of normals in this study would have provided the data needed to make a more detailed comparison.

Implications

Despite a decade or more of research in the area of learning disabilities, there is presently no agreement concerning the definition and description of learning disabled children. Important contributions have been made to our knowledge and understanding of characteristics commonly ascribed to these children; however, most of these behaviors

have little empirical evidence to support them. Continued research efforts are necessary in order to avoid inappropriate stereotypes. Examination of two characteristics linked with the learning disabled population -- oral language production difficulties and vocabulary deficiencies -- was the purpose of this present study.

The present study found that learning disabled children's mastery of syntactic items progressed gradually across a wide age range. This finding confirmed many observations which suggested that the oral expression and production difficulties of learning disabled children tend to be subtle, explaining why these problems are often overlooked in the classroom. Observation and analysis of oral language should be an integral part of classroom assessment procedures. Accordingly, the teachers could provide deliberate stimulating language experiences designed to accelerate development of syntactic patterns throughout the school years. These suggestions are in line with ongoing thinking in regard to differentiation of instruction. Similarly, the findings relating to vocabulary richness suggest that, as with syntax, teachers of the learning disabled should provide learning experiences to facilitate development of vocabulary.

Further, educators should be made aware of the findings of research which identify the behaviors associated with learning disabilities, such as gradual control of syntactic resources. Not only would knowledge of these behaviors be helpful to teachers in designing and implementing instructional strategies and techniques to facilitate syntactic growth but also when developing curriculum.

Research on the oral language development of the learning disabled is limited. The disciplines of special education, speech pathology, and language communications should develop a close working relationship in an effort to provide the best possible education for the learning disabled child. As professionals involved in the education process, they should depend on each other to provide in-depth diagnostic evaluations, information concerning methods, materials, and remedial strategies, appropriate tests to identify specific skill defects, and special language intervention programs. The research efforts among the disciplines should be coordinated to avoid duplication.

Recommendations for Future Research

Recommendations based on the findings and conclusions of this study:

1. Further study on the types of syntactic structures and patterns used by learning disabled children in their spontaneous oral language as they advance in age might be conducted. Information obtained would reveal the specific grammatical patterns and constructions that are used by children at differing age levels or, as important, those specific structures that are not used or used infrequently. Comparing these findings with a control group of normal children would reveal similarities or differences in the development of specific language abilities.

2. Studies similar to this one might be conducted with the following modifications: additional stimulus films to increase the language sample size, larger sample of children at each age level, more specific interview questions used to promote stimulating discussion, group sessions held prior to the research using a variety of stimuli to elicit oral language as a means of introducing children to the procedures, and the inclusion of a control group.

3. Studies similar to this one might be conducted with older learning disabled children to see if the syntactic developmental trends begin to more closely follow the pattern reported by O'Donnell, Griffin, and Norris (1967).

4. Further studies could be conducted to test the syntactic density formula as a valid measure of oral language, with attention to the identification of syntactic structures which discriminate between high and low quality oral language.

5. Previous research conducted with normal children has revealed that there are major differences in the syntax between oral and written discourse of children across a wide age range (Hunt, 1965; Loban, 1976; O'Donnell, Griffin, and Norris, 1967). Transformational grammar analysis could be applied to oral and written language samples of learning disabled children

as a method of observing the variety of sentence patterns at differing age levels. Findings with learning disabled children could be compared to the research findings involving normal children.

6. Further studies could be conducted to test the Vocabulary Intensity Index as a valid measure of vocabulary development when applied to oral language samples. Efforts should be made to determine if vocabulary is influenced by other factors not included in the formula or if the formula is dependent upon language sample size and the nature of the stimulus material, or if some of the factors included in the formula should be weighted to increase their discriminatory power.

7. Further studies similar to this one should be conducted with older learning disabled children to see if the vocabulary developmental trend as measured by the Vocabulary Intensity Index begins to more closely follow the pattern reported by Kidder (1974).

8. Further studies should be conducted using the corrected type-token ratio as a measure of vocabulary richness. Language sample sizes should be 500 to 1000 words to decrease the variability of this measure. Diverse stimulus materials should be used to decrease this measure's dependence upon the stimulus subject matter.

9. The procedures for classification and placement of children into classes for the learning disabled need to be further clarified and refined. A quantitative definition needs to be utilized to determine each child's eligibility for these classes. Children presently enrolled need to be reevaluated to determine if they have been properly placed.

BIBLIOGRAPHY

Bannatyne, A. Language, reading and learning disabilities. Springfield, Illinois: Charles E. Thomas, 1971.

Bateman, W. G. A child's progress in speech. Journal of Educational Psychology, 1914, 5, 307-320.

Bereiter, C., & Englemann, S. Teaching disadvantaged children in the preschool. Englewood Cliffs, New Jersey: Prentice-Hall, 1966.

Berko, J. The learning of English morphology. Word, 1958, 14, 150-177.

Block, B., & Trager, G. L. Outline of linguistic analysis. Baltimore, Maryland: Waverly Press, Inc., 1942.

Bloom, L. Language development: form and function of energizing grammars, Unpublished doctoral dissertation, Columbia University, 1968.

Bloomfield, L. Language. New York: H. Holt and Company, 1933.

Bougere, M. B. Selected factors in oral language related to first-grade reading achievement. Reading Research Quarterly, 1969, 5, 31-58.

Bradenburg, G.C., & Bradenburg, J. Language development during the fourth year. Pedogogical Seminary, 1916, 23, 14-29.

Brossard, J. H., & Boll, E. S. Sociology of child development. (3rd edition) New York: Harper and Brothers, 1953.

Brown, R., & Bellugi, U. Three processes in the child's acquisition of syntax. Harvard Education Review, 1964, 34, 133-151.

Brown, R., & Fraser, C. The acquisition of syntax. Child Development Monographs, 1964, 29, 43-79.

Brown, R., & Fraser, C. The development of wh - Questions in child speech. Journal of Verbal Learning and Verbal Behavior, 1968, 7, 279-290.

Carroll, J. B. Language development. In C. W. Harris (Ed.) Encyclopedia of education research. (3rd ed.) New York: MacMillan, 1960.

Carroll, J. B. Language and thought. Englewood Cliffs, New Jersey: Prentice-Hall, 1964.

Carroll, J. B. Personal Communication, July 26, 1977.

Chomsky, C. The acquisition of syntax in children from 5 to 10. M.I.T. Research Monograph Series, 1969, No. 57.

Chomsky, N. Syntactic structures. The Hague: Mounton and Company, 1957.

Chomsky, N. Aspects of the theory of syntax. Cambridge, Massachusetts: M.I.T. Press, 1965.

Ciani, A. J. Syntactic maturity and vocabulary diversity in the oral language of first, second, and third grade school children. Unpublished doctoral dissertation, Indiana University, 1974.

Davis, E. A. The development of linguistic skills in twins, singletons with siblings, and only children from age five to ten years. Institute of Child Welfare Monograph Series, 1937, No. 14.

Day, E. J. The development of language in twins. I. A comparison of twins and single children. Child Development, 1932, 3, 179-199.

Dictionary of occupational titles, Vol. II, Occupational classification, (3rd ed.) Washington, D.C.: U. S. Government Printing Office, Department of Labor, 1965.

Doehring, D. G. Patterns of impairment in specific reading disability. Bloomington: Indiana University Press, 1968.

Ervin-Tripp, S. Language development. In L. W. Hoffman and M. L. Hoffman (Eds.), Review of child development research, Vol. II. New York: Russell Sage Foundation, 1966.

Fox, S. E. Syntactic maturity and vocabulary diversity in oral language of kindergarten and primary school children. Unpublished doctoral dissertation, Indiana University, 1970.

Freud, J. E., & Williams, F. J. Elementary business statistics: The readers approach. Englewood Cliffs, New Jersey: Prentice-Hall, 1964.

Fries, C. C. A transformational analysis of the oral language structure used by two reading groups at the second grade level. Unpublished doctoral dissertation, University of Iowa, 1967.

Gale, M. C., & Gale, H. The vocabulary of three children in one family to two and a half years of age. Psychological Studies, 1900, 1, 70-117.

Golub, L. S. Linguistic structures in students: oral and written discourse. Research in The Teaching of English, 1969, 3, 40-85.

Golub, L. S. Personal communication, August 1, 1977.

Golub, L. &., & Fredrick, W. C. Linguistic structures and deviations in children's written sentences. Technical report from the Wisconsin Research and Development Center for Cognitive Learning. The University of Wisconsin, 1970, No. 152.

Golub, L. S., & Frederick, W. C. Linguistic structures in the discourse of fourth and sixth graders. Technical report from the Wisconsin Research and Development Center for Cognitive Learning. The University of Wisconsin, 1971, No. 166.

Golub, L. S., & Kidder, C. Syntactic density and the computer. Elementary English, 1974, 51, 1128-1131.

Harrell, L. E. An inter-comparison of the quality and rate of the development of oral and written language in children. Monographs of the Society for Research in Child Development, 1957, 22, No. 3.

Herdan, G. Type-token mathematics. The Hague: Morton & Company, 1960.

Hunt, K. W. Grammatical structures written at three grade levels. National Council of Teachers of English Research Reports, 1965, No. 3.

Hunt, K. W. Response to "how not to analyze the syntax of children" by Roger McCaig. Elementary English, 1970, 47, 619-623.

Johnson, D. J., & Myklebust, H. R. Learning disabilities and educational principles and practices. New York: Greene and Stratton, 1967.

Johnson, D. J. The language continuum. Bulletin of the Orton Society, 1968, 18, 1-11.

Kerlinger, F. N. Foundations of behavior research. (2nd ed.) New York: Holt, Rinehart, and Winston, 1964.

Kidder, C. L. Using the computer to measure syntactic density and vocabulary intensity in the writing of elementary school children. Unpublished doctoral dissertation, Pennsylvania State University, 1974.

Kirk, R. E. Experimental design procedures for the behavioral sciences. Belmont, California: Brooks-Cole Publishing Company, 1968.

Klima, E., & Bellugi, U. Syntactic regularities in the speech of children. In J. Lyons and R. Wales (Eds.) Psycholinguistic papers. Edinburgh: Edinburgh University Press, 1966.

Lee, L., & Caster, S. Developmental sentence scoring: a clinical procedure for estimating syntactic development in children's spontaneous speech. Journal of Speech and Hearing Disorders, 1971, 36, 315-340.

Lee, L. L. Development sentence types: a method for comparing normal and deviant syntactic development. Journal of Speech and Hearing Disorders, 1966, 31, 311-330.

Lefevre, C. Linguistics and the teaching of reading. New York: McGraw-Hill, 1964.

Lerner, J. W. Children with learning disabilities. Boston, Massachusetts: Houghton Mifflin Company, 1971.

Loban, W. The language of elementary school children. Champaign: National Council of Teachers of English, 1963, No. 1.

Loban, W. Problems in oral English. Champaign: National Council of Teachers of English, 1966.

Loban, W. D. Language development: kindergarten through grade twelve. Urbana: National Council of Teachers of English Research Reports, 1976, No. 18.

McCaig, R. A. How not to analyze the syntax of children: a critique and a proposal. Elementary English, 1970, 47, 612-617.

McCarthy, D. A. The language development of the preschool child. Institute of Child Welfare Monograph Series, 1973, No. 4.

McCarthy, D. A. Factors that influence language growth. Elementary English, 1952, 421-428.

McCarthy, D. A. Language development in children. In L. Carmichael (Ed.) Manual of child psychology. New York: John Wiley and Sons, 1954.

McGrady, H. J. Language pathology and learning disabilities. In H. Myklebust (Ed.) Progression learning disabilities, Vol. 1. New York: Greene and Stratton, 1968.

McNeill, D. Developmental psycholinguistics. In F. Smith and G. A. Miller (Ed.), The genesis of language: A psycholinguistic approach. Cambridge, Massachusetts: The M.I.T. Press, 1966.

Meier, J. H. Prevalence and characteristics of learning disabilities found in second grade children. Journal of Learning Disabilities, 1971, 4, 1-16.

Menyuk, P. Syntactic structures in the language of children. Child Development, 1963, 34, 407-422.

Menyuk, P. Comparison of grammar of children with functionally deviant and normal speech. Journal of Speech and Hearing Research, 1964, 7, 109-121 (a).

Menyuk, P. Syntactic rules used by children from preschool through first grade. Child Development, 1964, 35, 533-546(b).

Menyuk, P. Sentences children use. Cambridge, Massachusetts: M.I.T. Press, 1969.

Menyuk, P. The acquisition and development of language. Englewood Cliffs, New Jersey: Prentice-Hall, 1971.

Menyuk, P., & Looney, P. L. Problem of language disorder: length versus structure. Journal of Speech and Hearing Research, 1972, 15, 264-279(a).

Menyuk, P., & Looney, P. Relationships between components of the grammar in language disorders. Journal of Speech and Hearing Research, 1972, 15, 395-400(b).

Milner, E. A study of the relationship between reading readiness in grade one school children and patterns of parent child reaction. Child Development, 1951, 22, 100-110.

Morehead, D. M., & Ingram, D. The development of base syntax in normal and linguistically deviant children. In D. M. Morehead and A. E. Morehead (Eds.) Normal and deficient child language. Baltimore, Maryland: University Press, 1976.

Myklebust, H. R. Learning disorders: psychoneurological disturbances in childhood. Rehabilitation Literature, 1964, 25, 354-360.

Myklebust, H. R., & Johnson, D. Learning disabilities: educational principles and practices. New York: Greene and Stratton, 1967.

Nice, M. M. Speech development of a child from eighteen months to six years. Pedagogical Seminary, 1917, 24, 204-243.

O'Donnell, R. C.; Griffin, W. J.; & Norris, R. C. Syntax of kindergarten and elementary school children: a transformational analysis. National Council of Teachers of English Research Reports, 1967, No. 8.

O'Donnell, R. C. An objective measure of structural complexity in children's writing. Unpublished paper delivered at American Educational Research Association Meeting, 1968. In R O'Donnell. A review of some indices of language development. Studies in language education. Georgia University, March, 1975, No. 15.

O'Donnell, R. C. Language development: kindergarten through grade twelve: a review. Research in the Teaching of English, 1977, 11, 49-53.

Otto, W. C., & Chester, R. Sign words for beginning readers, Journal of Educational Research, 1972, 65, 435-443.

Rosenthal, J. H. A preliminary psycholinguistic study of children with learning disabilities. Journal of Learning Disabilities, 1970, 8, 391-395.

Ruddell, R. B., & Groves, B. W. Socio-ethnic status and the language achievement of first-grade children. Elementary English, 1968, 45, 635-642.

Schulte, C. A study of the relationship between oral language and reading achievement in second graders. Unpublished doctoral dissertation, University of Iowa, 1967.

Sexton, P. C. Education and income inequalities in our public schools. New York: Viking Press, 1961.

Shriner, T. H.; Holloway, M. S.; Daveloff, R. G. The relationship between articulatory deficits and syntax in speech defective children. Journal of Speech and Hearing Research, 1967, 12, 319-325.

Slegman, D. Sentence formulation deficits of learning disabled children. Unpublished clinical paper, Boston University, 1974.

Slobin, D. I. Grammatical transformations and sentence comprehension in childhood and adulthood. Journal of Verbal Behavior, 1966, 5, 219-227.

Strang, R., & Hocker, M. E. First grade children's language patterns. Elementary English, 1965, 42, 38-41.

Strickland, R. G. The language of elementary school children: its relationship to the language of reading textbooks and the quality of reading of selected children. Bulletin of the School of Education, Indiana University, July, 1962, 38, No. 4.

Strickland, R. G. Reaction to the article by Roger A. McCaig. Elementary English, 1970, 47, 631-632.

Snyder, A. D. Notes on the talk of a two-and-a-half year old boy. Pedagogical Seminary, 1914, 217, 412-424.

Templin, M. C. Certain language skills in children: their development and interrelationships. Institute of Child Welfare Monograph Series, 1957, No. 26.

Tressler, J. C.; Christ, H. J.; & Terino, A. E. English action. (7th Ed.) Boston: D. C. Heath and Company, 1960.

Wiig, E. H., & Semel, E. M. Language production deficits in learning disabled adolescents. Paper presented at the Second International Scientific Conference on Learning Disabilities, Brussels, 1975(a).

Wiig, E. H., & Semel, E. M. Productive language abilities in learning disabled adolescents. Journal of Learning Disabilities, 19[illegible], 578-386(b).

Vandemark, A. A., & Mann, M. B. Oral language skills of children with defective articulation. Journal of Speech and Hearing Research, 1965, 8, 409-414.

Vogel, S. A. Syntactic abilities in normal and dyslexic children. Unpublished doctoral dissertation, Northwestern University, 1974.

Zipf, G. K. The psycho-biology of language. Boston: Houghton-Mifflin Company, 1935.

Zigmond, N. Guide to implementation. Child Service Demonstration Center for Urban Secondary Students with Learning Disabilities. Pittsburgh, Pennsylvania: University of Pittsburgh (not dated).

APPENDIXES

APPENDIX A

COMPARISON OF METHODOLOGIES

ACROSS FOUR STUDIES

COMPARISON OF METHODOLOGIES ACROSS FOUR STUDIES

	Population, Location and Schools	Children	Data Collection Dates	Interviewers	Stimulus	Interview Questions	Number of Children Participating at One Time	Language Factors Measured
O'Donnell, Griffin, and Norris (1967)	26,000 urban, white middle-class southern city 1 public elementary-middle school 2 private kindergartens	180, 30 at each grade (K, first, second, third, fifth, and seventh) ranging in age from 5.3 to 14.6 years	March, 1965	three housewives with elementary teaching experience	two films - "The Ant and the Dove" and "The North Wind and the Sun" no sound	two types 1. Retell the story 2. Personal experience question relating to the moral of the story	3	syntactic maturity as measured by T-units
Fox (1970)	40,000 urban, white middle-class midwestern city 2 public elementary schools	80 children, 20 at each grade (K, first, second, and third) ranging in age from 5.4 to 10.5 years	April, 1969	two housewives with elementary teaching experience	two films - same as O'Donnell, Griffin, and Norris	similar to O'Donnell, Griffin, and Norris with the following modifications: (1) Child was given an opportunity to defend his/her opinion, and (2) The vocabulary was simplified	3	syntactic maturity as measured by T-units and vocabulary diversity as by the corrected type-token ratio
Cioni (1974)	2,400 rural white middle-class midwestern town 1 public elementary school	60 children, 20 at each grade (first, second, and third) ranging in age from 6.4 to 10.3 years	March, 1973	the investigator	one film - "The Daisy" no sound	three types 1. Retelling of story 2. Specific questions relating to the content 3. Evaluative - judgmental question - Did you like the story? Why?	1	syntactic maturity as measured by T-units and vocabulary diversity as measured by the corrected type-token ratio
Present study (1978)	192,034 urban and rural white middle-class southwestern Pennsylvania county 14 public elementary and junior high schools	80 learning disabled children, 20 at each age level, ranging in age from 7.5 to 13.5	October, 1977	the investigator and one substitute elementary school teacher	two films - same as O'Donnell, Griffin, and Norris and Fox	Same as Fox	3	syntactic maturity as measured by T-units and the Syntactic Density Score and vocabulary richness as measured by the corrected type-token ratio and the Vocabulary Intensity Index

APPENDIX B

PARENT PERMISSION LETTER

University of Pittsburgh

FACULTY IN LANGUAGE COMMUNICATIONS
Division of Teacher Development • School of Education

September 1, 1977

Dear Parent or Guardian of _____:

Mr. George E. Kensinger, Executive Director of the Department for Exceptional Children, Appalachia Intermediate Unit 08 and Mr. Earl E. Bonnett, Director of Special Education have given me permission to gather data for my research project. I am a doctoral candidate at the University of Pittsburgh studying the oral language development of children.

In order to collect information, I am requesting permission from you to obtain a spontaneous oral language sample from your child. _____ will be shown two short films with the sound track turned off. At the conclusion of each film, _____ will be asked to tell the story _____ saw. The entire session should take a maximum of 1/2 hour and will be scheduled so that your child will not miss any special classroom instruction.

The results of the research project will be sent to Mr. Kensinger, the Superintendent and Principal of the school, and your child's teacher. The results will be available to you through the classroom teacher.

I am asking your cooperation in this study because I expect the findings to be very helpful in planning improved programs for the children with special learning problems.

Please respond to the statements on the following page and return to me by Monday, September 12, 1977 in the enclosed self-addressed stamped envelope. If I do not hear from you by this date, I will assume that my request meets with your permission. If you have any questions please indicate so on the attached form and I will call you.

Thank you for your cooperation.

Sincerely,

Charlene Andolina
Doctoral Student, Language Communications
University of Pittsburgh

1017 CATHEDRAL OF LEARNING, PITTSBURGH, PA. 15260 (412) 624-6185

Dear Ms. Andolina:

	Yes	No
You have my permission to obtain a spontaneous oral language sample from my child.	___	___
You may have access to my child's records which are housed at the Department of Exceptional Children in Ebensburg and at his/her school district.	___	___
I have some questions and would appreciate you calling me.	___	___

_____ _____

Parent Signature Date

Name of Child _____

Name of School _____

APPENDIX C

OCCUPATION TITLES

OCCUPATIONAL CATEGORIES, DIVISIONS, AND GROUPS

1. Professional, Technical, and Managerial Occupations

    Occupations in architecture and engineering
    Occupations in mathematics and physical sciences
    Occupations in life sciences
    Occupations in social sciences
    Occupations in medicine and health
    Occupations in education
    Occupations in museum, library, and archival sciences
    Occupations in law and jurisprudence
    Occupations in religion and theology
    Occupations in writing
    Occupations in art
    Occupations in entertainment and recreation
    Occupations in adminstrative specializations
    Managers and officials, n.e.c.*
    Miscellaneous professional, technical and managerial occupations

2. Clerical and Sales Occupations

    Stenography, typing, filing and related occupations
    Computing and account-recording occupations
    Material and production recording occupations
    Information and message distribution occupations
    Miscellaneous clerical occupations
    Salesmen, services
    Salesmen and salespersons, commodities
    Merchandising occupations, except salesmen

3. Service Occupations

    Domestic service occupations
    Food and beverage preparation and service occupations
    Lodging and related service occupations
    Barbering, cosmetology, and related service occupations
    Amusement and recreation service occupations
    Miscellaneous personal service occupations
    Protective service occupations
    Building and related service occupations

4. Farming, Fishery, Forestry, and Related Occupations

    Plant farming occupations
    Animal farming occupations
    Miscellaneous farming and related occupations
    Fishery and related occupations
    Forestry occupations
    Hunting, trapping, and related occupations
    Agricultural service occupations

* Not elsewhere classified

5. Processing Occupations

Occupations in processing of metal
Ore refining and foundry occupations
Occupations in processing of food, tobacco, and related products
Occupations in processing of paper and related materials
Occupations in processing of petroleum, coal, natural and manufactured gas, and related products
Occupations in processing of chemicals, plastic, synthetics, rubber, paint, and related products
Occupations in processing of wood and wood products
Occupations in processing of stone, clay, glass and related products
Occupations in processing of leather, textiles, and related products
Processing occupations, n.e.c.

6. Machine Trades Occupations

Metal machining occupations
Metalworking occupations, n.e.c.
Mechanics and machinery repairmen
Paperworking occupations
Printing occupations
Wood machining occupations
Occupations in machining stone, clay, glass and related materials
Textile occupations
Machine trades occupations, n.e.c.

7. Bench Work Occupations

Occupations in fabrication, assembly, and repair of metal products, n.e.c.
Occupations in fabrication and repair of scientific and medical apparatus, photographic and optical goods, watches and clocks and related products
Occupations in assembly and repair of electrical equipment
Occupations in fabrication and repair of products made from assorted materials
Painting, decorating, and related occupations
Occupations in fabrication and repair of plastics, synthetics, rubber, and related products
Occupations in fabrication and repair of wood products
Occupations in fabrication and repair of sand, stone, clay, and glass products
Occupations in fabrication and repair of textile, leather, and related products
Bench work occupations, n.e.c.

8. Structural Work Occupations

Occupations in metal fabricating, n.e.c.
Welders, flame cutters, and related occupations
Electrical assembling, installing, and repairing occupations
Painting, plastering, waterproofing, cementing, and related occupations
Excavating, grading, paving, and related occupations
Construction occupations, n.e.c.
Structural work occupations, n.e.c.

9. Miscellaneous Occupations

Motor freight occupations
Transportation occupations, n.e.c.
Packing and materials handling occupations
Occupations in extraction of materials
Occupations in logging
Occupations in production and distribution of utilities
Amusement, recreation, and motion picture occupations, n.e.c.
Occupations in graphic art work

APPENDIX D

INFORMATION AND INSTRUCTIONS

FOR THE

INVESTIGATOR, INTERVIEWERS AND TEACHERS

Procedure in the Projection Room

1. When introduced to the child, make sure that you remember his or her name and grade level so that you can mark it down on the tape record. Initiate a short, friendly conversation to relax the child.

2. Before the movie, say: WE ARE GOING TO SHOW YOU A STORY CALLED, "THE ANT AND THE DOVE." IT IS A CARTOON AS YOU HAVE SEEN ON TV AND AT THE MOVIES BUT IT WILL BE DIFFERENT THAN THOSE YOU HAVE SEEN BEFORE. THERE WILL BE NO SOUND. WHEN IT IS FINISHED, YOU WILL BE ASKED TO TELL THE STORY THAT YOU SAW. WE HOPE THAT YOU WILL ENJOY THE MOVIE.

3. After the film showing, take the child to the place where you are taping.

10. Before the second film is shown, say to him: WE ARE GOING TO SHOW YOU ANOTHER STORY WHICH IS ABOUT THE NORTH WIND AND THE SUN. WHEN IT IS FINISHED, YOU WILL BE ASKED TO TELL THE STORY YOU SAW.

11. Take the child again to the place where you are taping.

Procedure for Examiners

4. Be sure to turn on the tape recorder as unobtrusively as possible.

5. Child's name, WILL YOU TELL ME THE STORY YOU HAVE JUST SEEN OF "THE ANT AND THE DOVE?"

6. When he has finished, ask: WOULD YOU LIKE TO ADD ANYTHING TO YOUR STORY?"

7. After the child has finished answering say: THAT WAS FINE!

8. SOME PEOPLE THINK THIS FILM SHOWS THAT WHEN A GOOD THING IS DONE TO ONE PERSON, HE SHOULD DO SOMETHING NICE ALSO. CAN YOU THINK OF A TIME WHEN SOMETHING NICE WAS DONE TO YOU OR ANYONE YOU KNOW -- WAS SOMETHING NICE DONE IN RETURN? TELL ME ABOUT IT.

9. When he has finished, thank him and take him back to the projection room. (Turn the tape recorder off)

12. (Turn the tape recorder on again)

13. Child's name, NOW THAT YOU HAVE SEEN THE MOVIE, "THE NORTH WIND AND THE SUN," WILL YOU TELL ME THE STORY?

14. When the child stops, ask him: WOULD YOU LIKE TO ADD ANYTHING TO YOUR STORY?

15. When he has finished, ask: SOME PEOPLE THINK THAT THIS FILM SHOWS THAT IT IS BETTER TO BE KIND AND GENTLE, LIKE THE SUN, THAN MEAN AND STRONG, LIKE THE NORTH WIND. CAN YOU TELL ME OF ANYTHING THAT HAS HAPPENED TO YOU OR ANYONE YOU KNOW THAT SHOWS IT IS BETTER TO BE KIND AND GENTLE THAN TO BE MEAN AND STRONG?

16. Thank and escort the child back to the room. Turn off the recorder.

APPENDIX E

PROCEDURES FOR ORIENTATION MEETINGS

First Orientation Meeting

1. The investigator and prospective interviewer spoke informally to establish rapport. Based on this conversation, the investigator decided to ask her to participate in the study.
2. The interviewer's role in the study was explained.
3. The study was discussed in depth.
4. The two Aesop fable films were viewed.
5. The data collection procedures and the interviewer instruction sheets were reviewed.
6. The interviewer was given a copy of the instruction sheets to review before the second meeting.
7. A question and answer period followed to clarify any procedures.
8. Arrangements were made to meet a week later at one of the schools included in the study where we would follow the procedures with two children not involved in the study.

Second orientation meeting

1. All of the equipment was arranged as per the outlined procedures.
2. The investigator and interviewer went to the classroom to meet one child.
3. The films were shown and the investigator conducted an interview while the interviewer observed the procedure from an adjoining room.

4. The investigator then observed the interviewer completing the procedures.
5. The investigator and interviewer listened to the tapes evolving from the session, discussed the observation and noted any inconsistencies in the interviewing procedures as well as the ability of the interviewer to facilitate oral language.

APPENDIX F

SYNTACTIC DENSITY TABULATION SHEET

SYNTACTIC DENSITY SCORE

Tabulation Sheet

Variable Number	Variable Description	Variable Loading	Frequency	VLXF
	Total number of words			
	Total number of T-units			
1.	Words/T-unit	.95	X ____	____
2.	Subordinate clauses/T-unit	.90	X ____	____
3.	Main clause word length (mean)	.20	X ____	____
4.	Subordinate clause word length (mean)	.50	X ____	____
5.	Number of Modals (will, shall, can, may, must, would...)	.65	X ____	____
6.	Number of Be and Have forms in the Auxiliary	.40	X ____	____
7.	Number of Prepositional Phrases	.75	X ____	____
8.	Number of Possessive Nouns	.70	X ____	____
9.	Number of Adverbs of Time (when, then, once, while...)	.60	X ____	____
10.	Number of gerunds, participles, and absolute phrases (unbound modifiers)	.85	X ____	____
	Total			____
	SDS			____
	S.D. Score (Total/No. of T-units)			____
	Grade Level Conversion			____

Grade Level Conversion Table:

SDS	.5	1.3	2.1	2.9	3.7	4.5	5.3	6.1	6.9	7.7	8.5	9.3	10.1	10.9
Grade Level	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Copyright c by Lester S. Golub

APPENDIX G

RULES OF PUNCTUATION

Period

1. Use a period after declarative and imperative sent.
   * elliptical sentences which answer questions (e.g., no. of course)

Comma

1. Set off appositives
2. Set off parenthetic expressions
3. Set off he said or similar expression from a direct question
4. Set off (1) yes, no, (2) introductory well, why or now
5. Use comma to separate words or expressions in a series
6. Use comma between independent clauses of compound sentence if they are joined by a conjunction and, but, or, nor
7. Use comma between statement and brief question depending on it when the subject of both statement and question is the same person or thing
8. Use comma to separate two words or sets of figures that might otherwise be misunderstood

Semicolon

1. Use semicolon to separate sentence parts of equal rank if one or more of these parts are subdivided by commas
2. Use semicolon between the clauses of a compound sentence if they are not joined by a conjunction

Colon

1. Use a colon to introduce a clause or statement that explains, restates or proves the statement in the preceding clause or clauses

Question Mark

1. Use a question mark after a direct question, but not an indirect question

Exclamation Point

1. Use after an expression of strong or sudden feeling

Quotation Marks

1. Use to enclose a direct quotation, but not to enclose an indirect quotation

   - Place period or comma inside quotation marks

   - Place semicolon or colon outside

   - Place question mark or exclamation mark inside when it is part of the quotation - otherwise outside

APPENDIX H

SAMPLE PRINTOUT OF TEXT

AND

TABULATION SHEET FOR

SYNTACTIC DENSITY PROGRAM

THIS VERY MINUTE A LIZARD WITH CHANGEABLE COLORS IS CATCHING INSETS WITH THE END OF TONGUE AS LONG AS ITS BODY. CLOSE TO THE BOTTOM OF A RIVER . A FISH IS DEFENDING ITSELF BY JOLTING ITS ENEMIES WITH BUILT-IN ELECTRIC SHOCK EQUIPMENT . IN THE TROPICS AN ALMOST BRAINLESS MAMMAL IS SPENDING A LARGE PART OF ITS LIFE UPSIDE DOWN . AND ON ANOTHER PART OF THE EARTH A QUEER , FURRY , LEATHERY-BEAKED ANIMAL WITH POISONOUS SPURS ON ITS HIND LEGS IS LAYING EGGS ..

THESE ARE ONLY A FEW OF THE STRANGE BEASTS THAT YOU CAN SEE IN THE WORLD TODAY . ALL OF THEM ARE VERY MUCH ALIVE ALTHOUGH THEY MAY APPEAR TOO ASTONISHING TO BE REAL . BUT A GREAT MANY YEARS FROM NOW A LOT OF THEM WILL HAVE VANISHED FOREVER . THOSE KINDS WHICH REMAIN WILL PROBABLY BE SO CHANGED THAT YOU WOULD HARDLY RECOGNIZE THEM . WE KNOW THAT THIS WILL HAPPEN BECAUSE DOZENS OF SCIENTISTS HAVE SHOWN THAT NEARLY EVERY LIVING THING IS ALWAYS TURNING INTO SOMETHING A LITTLE DIFFERENT OR DISAPPEARING ENTIRELY . THE EARTH ITSELF IS CONSTANTLY CHANGING , TOO ..

WE HAVE FOSSIL REMAINS THAT SHOW US THE CHANGES THAT HAVY TAKEN PLACE THROUGHOUT THE AGES IN CERTAIN ANIMAL AND FISH GROUPS ..

&&&

UNION OF DATA INDEX PROGRAM COMPLETED NORMAL EXEC

SYNTACTIC DENSITY SCORE
TABULATION SHEET

VARIABLE NUMBER	VARIABLE DESCRIPTION	VARIABLE LOADING		FREQUENCY	VLXF
	TOTAL NUMBER OF WORDS			202	
	TOTAL NUMBER OF T-UNITS			11	
1.	WORDS/T-UNIT	.95	X	18.364	17.445
2.	SUBORDINATE CLAUSES PER T-UNIT	.90	X	0.545	0.491
3.	MAIN CLAUSE WORD LENGTH (MEAN)	.20	X	11.182	2.236
4.	SUBORDINATE CLAUSE WORD LENGTH (MEAN)	.50	X	13.167	6.583
5.	NUMBER OF MODALS (WILL, SHALL, MAY, ETC.)	.65	X	6	3.891
6.	NUMBER OF BE AND HAVE FORMS	.40	X	14	5.578
7.	NUMBER OF PREPOSITIONAL PHRASES	.75	X	22	16.500
8.	NUMBER OF POSSESSIVE NOUNS AND PRONOUNS	.70	X	4	2.781
9.	NUMBER OF ADVERBS OF TIME	.60	X	4	2.375
10.	NUMBER OF GERUNDS, PARTICIPLES AND ABSOLUTES	.85	X	7	5.906
	TOTAL		=		63.787
	SD SCORE (TOTAL DIVIDED BY NUMBER OF T-UNITS)		=		5.799

GRADE LEVEL CONVERSION TABLE

SDS:	1.0	1.5	2.0	2.5	3.0	3.5	4.0
GRADE LEVEL:	1	2	3	4	5	6	7

APPENDIX I

BASIC WORD LIST

the	a	to	and	of
in	you	is	he	it
that	was	on	for	are
they	I	with	his	said
at	as	have	she	what
one	this	all	had	from
be	can	but	there	not
when	how	were	your	do
each	will	up	many	we
then	her	or	out	some
them	write	their	words	about
by	like	see	so	if
these	make	into	him	other
word	would	water	little	two
had	did	people	an	which
could	time	more	down	my
no	go	get	now	long
find	look	made	just	big
very	back	first	way	over
too	than	good	use	day
where	called	me	went	put
around	new	know	come	who
things	its	came	right	air
sound	think	tell	after	Mr.
man	may	much	does	say
same	been	take	only	old
away		help	looked	why
work	through	here	animals	place
before	three	home	house	again
another	number	our	must	off
name	(Mother)*	asked	picture	most
part	used	food	saw	different
live	well	any	school	even
under	line	because	thought	next
small	every	going	want	something
earth	last	men	plants	read
left	hear	show	end	don't
found	eat	boy	need	still
keep	together	sun	us	got
Mrs.	great	(Father)*	along	night
took	sentence	story	land	never
always	sentences	play	began	give
years	boys	also	below	head

* Words which were duplicates except for the capitalization were eliminated before programming.

grow	set	paper	it's	morning
I'll	while	soon	let	hard
hearts	side	until	should	sometimes
own	dog	door	once	birds
days	enough	near	trees	kind
oh	top	didn't	draw	letters
told	country	white	large	I'm
year	letter	wanted	fish	2
car	city	ran	page	spelling
3	world	eyes	high	ever
kinds	might	four	few	move
sure	1	miss	fit	tree
knew	often	almost	ground	room
such	vowel			sea
heard	cry	ways	picture	money
box	cut	thing	far	mother
today	cold	inside	run	cried
fast	4	answer	best	light
red	means	hand	green	gave
across	yes	says	learn	can't
change	both	Indians	sounds	turn
places	warm	Sam	without	between
short	lived	times	turned	stop
family	form	black	others	those
am	living	horse	front	seen
started	makes	ready	eggs	nobody
whole	blue	stood	table	Jim
moon	song	miles	baby	beautiful
girls	second	above	leaves	girl
sat	bird	town	cannot	friends
walked	fire	call	plant	talk
that's	animal	important	really	soil
ball	hot	sky	study	ago
spell	looking	stay	toward	feel
young	Bill	himself	tells	fly
6	cat	5	hold	comes
face	stopped	wind	window	done
half	walk	true	dark	sing
summer	missing	outside	behind	learned
open	book	six	glass	ice
coming	start	ten	five	watch
road	winter	milk	goes	gold
rain	river	garden	Indian	John
piece	buy	nothing	catch	fine
everyone	Tom	legs	A	grass
Jack	cried	listen	someone	happy
being	happened	everything	gone	numbers
order	sleep	strong	anything	try
let's	snow	tall	round	Bucky
care	hands	names	store	Ann
built	ones	hit	maybe	class
fun	street	space	bed	complete

carry	slowly	woman	hole	remember
ship	King	stand	tiny	friend
kept	ride	Sally	tail	seeds
against	covered	wood	bright	cars
father	game	rest	Eddie	sets

APPENDIX J

VOCABULARY INTENSITY TABULATION SHEET

VOCABULARY INTENSITY INDEX

TABULATION SHEET

Number of Word Types = _____

Number of Multisyllable Words = _____

Number of Tokens That are Not on Basic Word List = _____

Number of Words with Prefixes = _____

Number of Words with Suffixes = _____

Number of Words with Affixes = _____

Total = _____

Simple Type/Token Ratio = _____

VII Total/Tokens

Vocabulary Intensity Index = _____

APPENDIX K

SAMPLE PRINTOUT

OF

VOCABULARY INTENSITY TABULATION SHEET

VOCABULARY INTENSITY INDEX

TABULATION SHEET

NUMBER OF WORD TYPES	=		131
NUMBER OF MULTISYLLABLE WORDS	=		61
NUMBER OF TOKENS THAT ARE NOT ON BASIC WORD LIST	=		75
NUMBER OF WORDS WITH PREFISES	=	13	
NUMBER OF WORDS WITH SUFFIXES	=	15	
NUMBER OF WORDS WITH AFFIXES	=		28
TOTAL	=		295
TOTAL NUMBER OF WORD TOKENS	=		202
SIMPLE TYPE/TOKEN RATIO	=		0.65

VII - TOTAL/TOKENS

VOCABULARY INDENSITY INDEX (VII)	=	1.46

APPENDIX L

SCORES FOR MEASURES OF SYNTACTIC MATURITY AND VOCABULARY RICHNESS

Listed below are the scores for the children on all measures of syntax and vocabulary. Identification numbers were used to preserve the anonymity of the children. The first two digits identify the school while the last two identify the child.

Syntax

X_1 - number of T-units
X_2 - length of T-unit
X_3 - Syntactic Density Score
X_4 - total word count

Vocabulary

X_5 - corrected type-token ratio
X_6 - Vocabulary Intensity Index
X_7 - simple type-token ratio
X_8 - number of different words spoken

Syntax

Child	Group	X_1	X_2	X_3	X_4
0001	1	052	8.51	1.89	467
0003	3	059	7.52	1.74	467
0007	2	022	8.59	2.37	199
0008	4	037	8.65	2.34	337
0009	3	063	8.26	1.91	548
0010	2	048	8.02	1.57	405
0011	3	014	8.48	2.42	124
0102	1	041	8.55	2.14	369
0105	2	020	8.45	2.50	178
0109	2	070	7.32	1.47	539
0201	2	050	7.50	1.75	396
0203	1	023	6.52	1.62	158
0204	1	022	7.98	2.23	185
0206	1	017	6.14	1.78	110
0208	2	012	5.70	1.84	072
0301	4	058	8.22	1.76	503
0303	3	048	8.07	1.79	408
0304	3	106	8.34	1.68	931
0305	2	033	8.17	1.83	284
0306	4	096	7.20	1.47	728
0401	3	053	8.71	2.07	487
0402	1	025	6.46	1.54	170
0403	1	013	6.06	1.59	083
0404	1	071	8.04	1.78	601
0406	1	029	7.24	1.97	221
0407	1	029	7.67	1.77	233
0501	3	054	9.34	2.10	532
0502	3	024	7.36	1.75	186
0504	3	042	7.58	1.56	335
0505	3	038	7.00	1.44	280
0506	3	054	7.78	1.76	442
0507	2	065	6.83	1.59	490
0508	3	054	8.39	1.68	477
0509	4	070	8.48	1.67	626
0510	2	048	9.07	1.87	458
0511	3	057	6.90	1.42	413
0603	4	059	6.94	1.50	431
0604	4	075	8.90	1.92	703

Child	Group	X_1	X_2	X_3	X_4
0605	4	023	9.04	2.52	219
0607	4	054	6.90	1.25	391
0703	4	070	8.20	1.75	604
0704	2	053	6.85	1.26	382
0706	4	062	7.56	1.69	494
0707	3	064	8.31	1.94	560
0709	1	030	5.45	1.11	172
0802	3	034	7.12	1.68	255
0803	3	028	8.07	1.64	238
0805	4	026	9.32	2.19	255
0806	1	036	8.31	1.91	315
0812	2	049	7.34	1.83	380
0901	1	079	7.11	1.33	589
0902	1	021	7.28	2.00	160
1001	4	037	8.42	2.10	329
1002	2	023	6.73	1.55	163
1003	2	051	8.25	1.89	443
1004	3	089	8.06	1.83	755
1008	2	067	7.88	1.64	555
2001	4	053	8.44	1.60	470
2003	4	040	7.55	1.60	316
3001	4	037	8.26	1.66	323
3002	4	051	6.56	1.31	352
3003	4	038	7.50	1.77	299
4001	2	068	7.68	1.62	486
4002	1	050	6.82	1.22	359
4003	2	059	7.49	1.51	465
4004	2	018	7.49	1.81	142
4005	1	026	9.57	2.07	261
4006	2	030	5.54	1.16	175
4007	1	030	7.70	1.89	243
4008	1	045	8.25	1.74	391
4009	2	059	8.47	1.70	526
4010	1	043	7.40	1.62	335
4011	1	023	6.90	1.71	166
5002	4	049	8.96	1.87	462
5003	3	085	8.43	1.59	753
5004	3	073	7.39	1.73	566
5005	4	052	7.16	1.33	392
5007	3	046	7.02	1.67	339
5008	2	048	8.75	1.49	440
6001	4	043	8.17	1.81	371

Vocabulary

Child	Group	X_5	X_6	X_7	X_8
0001	1	5.07	0.65	0.33	155
0003	3	5.01	0.73	0.33	153
0007	2	4.01	0.77	0.40	080
0008	4	4.08	0.73	0.31	106

Child	Group	X_5	X_6	X_7	X_8
0009	3	5.29	0.65	0.32	175
0010	2	4.74	0.71	0.33	135
0011	3	4.32	1.08	0.55	068
0102	1	5.41	0.83	0.40	147
0105	2	4.51	0.90	0.48	085
0109	2	4.87	0.66	0.30	160
0201	2	4.80	0.81	0.34	135
0203	1	3.94	0.87	0.44	070
0204	1	3.64	0.81	0.38	070
0206	1	3.37	0.90	0.45	050
0208	2	3.33	1.13	0.56	040
0301	4	5.45	0.74	0.34	173
0303	3	4.55	0.73	0.32	130
0304	3	7.51	0.77	0.35	324
0305	2	3.90	0.68	0.33	093
0306	4	6.58	0.75	0.41	251
0401	3	5.16	0.86	0.43	161
0402	1	3.96	0.86	0.43	073
0403	1	3.57	1.02	0.55	046
0404	1	5.88	0.76	0.34	204
0406	1	4.14	0.80	0.39	087
0407	1	4.22	0.79	0.39	091
0501	3	6.01	0.71	0.37	196
0502	3	3.73	0.82	0.39	072
0504	3	4.64	0.70	0.36	120
0505	3	4.48	0.81	0.38	106
0506	3	4.91	0.71	0.33	146
0507	2	5.65	0.76	0.36	177
0508	3	4.99	0.71	0.32	154
0509	4	5.88	0.70	0.[illegible]	208
0510	2	4.82	0.70	0.32	146
0511	3	4.07	0.67	0.28	117
0603	4	4.46	0.71	0.30	131
0604	4	6.81	0.74	0.35	248
0605	4	4.35	0.89	0.42	091
0607	4	4.86	0.69	0.35	136
0703	4	6.01	0.80	0.35	209
0704	2	5.03	0.79	0.36	139
0706	4	4.96	0.66	0.32	156
0707	3	5.89	0.69	0.35	197
0709	1	4.04	0.91	0.44	075
0802	3	4.92	0.86	0.44	111
0803	3	4.49	0.89	0.41	098
0805	4	4.25	0.78	0.38	096
0806	1	4.38	0.71	0.35	110
0812	2	4.24	0.72	0.31	117
0901	1	6.38	0.79	0.37	219
0902	1	3.91	0.84	0.44	070
1001	4	5.11	0.79	0.40	131
1002	2	4.10	0.87	0.45	074
1003	2	5.04	0.68	0.34	150

Child	Group	X_5	X_6	X_7	X_8
1004	3	7.03	0.77	0.36	273
1008	2	6.09	0.77	0.37	203
2001	4	4.89	0.68	0.32	150
2003	4	4.38	0.70	0.35	110
3001	4	4.80	0.87	0.38	122
3002	4	5.66	0.79	0.36	127
3003	4	4.66	0.85	0.38	114
4001	2	5.65	0.76	0.36	176
4002	1	4.78	0.72	0.36	128
4003	2	4.92	0.67	0.32	150
4004	2	4.09	0.89	0.49	069
4005	1	4.46	0.76	0.39	102
4006	2	3.58	0.86	0.38	067
4007	1	4.31	0.80	0.39	095
4008	1	4.69	0.74	0.34	131
4009	2	6.51	0.81	0.40	211
4010	1	4.44	0.71	0.34	115
4011	1	4.39	0.92	0.48	080
5002	4	5.79	0.78	0.38	176
5003	3	4.28	0.76	0.22	166
5004	3	5.86	0.79	0.35	197
5005	4	4.64	0.74	0.33	130
5007	3	4.84	0.82	0.37	126
5008	2	5.23	0.77	0.35	155
6001	4	4.15	0.69	0.30	113

APPENDIX M

TREND ANALYSIS

Analysis of Variance and Trend Analysis for
Number of T-units Across Four Age Levels

Source	df	Mean Squares	F
Between Groups	3	1443.6458	4.022**
Linear Trend	1	3451.5625	9.616**
Quadratic Trend	1	690.3125	1.923
Within Groups	76	358.9507	

** Significant at the .01 level

Linearity

degrees of freedom (df) - The sum of the squares between groups (SS_{BG}) can be portioned into as many trend components as there are degrees of freedom for treatment levels (Kirk, 1968, p. 121). In this study the SS_{BG} is three, therefore, there is one degree of freedom for the linear trend, one degree of freedom for a quadratic trend, and one degree of freedom for a cubic trend (which was never computed since there was never a significant quadratic trend)

$$\text{Sum of Squares } (SS_{lin}) = \frac{B_1^2}{k} \qquad n_1 \qquad C_2^2$$

$$\text{Mean Square } (MS_{lin}) = \frac{SS_{lin}}{df}$$

$$F = \frac{MS_{lin}}{MS_{WG}}$$

Quadratic

degrees of freedom - Defined in degrees of freedom for linear trends

$$\text{Sum of Squares } (SS_{quad}) = \frac{B_2^2}{k} \qquad n_1 \qquad C\frac{2}{2}$$

$$\text{Mean Square } (MS_{quad}) = \frac{SS_{quad}}{df}$$

$$F = \frac{MS_{quad}}{MS_{WG}}$$

Quadratic Trend

VITA

Charlene Andolina was born in Connellsville, Pennsylvania on January 28, 1948. She attended public elementary school in Connellsville and was graduated from Our Lady of Mercy Academy, Monroeville, Pennsylvania, in May, 1965.

She attended Carlow College from 1965-1969, receiving a B.S. in speech pathology. In the Spring of 1969 she became an Itinerant Speech Therapist for the Allegheny Intermediate Unit 3. Ms. Andolina enrolled in the Master's Degree Program at the University of Pittsburgh, Language Communications Department, in 1973, receiving her M.Ed. and reading specialist certification in the Summer of 1974.

In the Fall of 1974 she accepted a position with Pace School in Pittsburgh, a private school for children with learning disabilities. She taught in this self-contained class for one year. Concurrently, she began a certification program in Special Education at the University of Pittsburgh where she completed it two years later.

In the Fall of 1975 Ms. Andolina entered the doctoral program in Language Communications at the University of Pittsburgh. At the end of her first year she was awarded a graduate assistantship. During the year Ms. Andolina was assistant to the coordinator of the reading clinic and team taught a course in College Reading and Study Skills.

In January of 1977 Ms. Andolina was appointed as a teaching fellow at the University of Pittsburgh. Her major responsibilities were teaching an undergraduate reading methods course offered to majors in Early Childhood Education, assisting the coordinator of the reading clinic, and the administration and supervision of two

Practicums for Masters Degree students. In addition Ms. Andolina was a consultant for the Right-to-Read Program in the Brentwood School District.

She is a member of the College Reading Association, the International Reading Association, the National Council of Teachers of English, and the National Reading Conference.